



A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

10010 E. 16TH STREET
TULSA, OK 74128-4813

ENGINEERING • ENVIRONMENTAL • CONSTRUCTION
(918) 665-6575 FAX (918) 665-6576

March 8, 2001

*WOM
3/15/01*

Mr. William R. Mann
Groundwater Protection Branch
U. S. Environmental Protection Agency
Region IV
61 Forsyth S. W.
Atlanta, Georgia 30303

RE: Permit Renewal Application for IMCO Recycling Industrial Injection Well,
Morgantown, Kentucky
Permit No. KY10429

Dear Mr. Mann:

Enclosed is a copy of the Permit Renewal Application for IMCO's Injection Well.

The Mechanical Integrity Test (MIT) and Pumping Tests were conducted on February 26-27, 2001, in your presence. The MIT passed. The Pumping Test data will be evaluated and sent to you separately.

If you have any questions or need additional information, please call me at (918) 665-6575.

Sincerely yours,

Irfan Taner
Chief Geologist

PERMIT RENEWAL APPLICATION
FOR
CLASS I NON-HAZARDOUS
INDUSTRIAL INJECTION WELL
(UIC Permit No. KY10429)

IMCO Recycling Inc.
Morgantown Plant
Morgantown, Kentucky

January 2001

Prepared by
A & M Engineering and Environmental Services, Inc.
10010 East 16th Street
Tulsa, Oklahoma 74128
918-665-6575

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

EPA **COMPLETION FORM FOR INJECTION WELLS**

ADMINISTRATIVE INFORMATION

1. Permittee

IMCO Recycling Inc.

Address (Permanent Mailing Address) (Street, City, State, and ZIP Code)

5215 N. O'Connor Blvd., Ste 1500
Irving, TX 75039

2. Operator

IMCO Recycling Inc.

Address (Street, City, State, and ZIP Code)

609 Gardner Lane Road (Hwy 1468)
Morgantown, KY 42261

3. Facility Name

Telephone Number
(502) 526-5688

IMCO Morgantown Plant

Address (Street, City, State, and ZIP Code)

609 Gardner Lane Road (Hwy 1468)
Morgantown, KY 42261

4. Surface Location Description of Injection Well(s)

| State | | County | |
|---|-----------------------------|-------------|--|
| Kentucky | | Butler | |
| 1/4 of | 1/4 of | 1/4 section | |
| - | - | 14 | |
| Township | Range | | |
| I | 34 | | |
| Feet from (N/S) | Line of quarter section and | | |
| 2340 feet from S line | - | | |
| Feet from (E/W) | Line of quarter section | | |
| 160 feet from E line | - | | |
| Submit with this Completion Form the attachments listed in Attachments for Completion Form. | | | |

CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32).

| | | |
|--|--|-------------|
| NAME AND OFFICIAL TITLE (Please type or print) | SIGNATURE | DATE SIGNED |
| C. Lee Newton, Senior V.P. |  | 3/13/07 |

TOPO MORGANTOWN 1973
CARTER COORDINATES
I 34 SCALE: 1" = 2000'

2340 FSL

160 FEL

LATITUDE = 37°12'23"
LONGITUDE = 86°43'03"

Magnetic North

HENRY MEREDITH
(SURFACE & MINERALS)

DENZIL COLEMAN
(SURF. & MIN.)

INTERNATIONAL METAL COMPANY
(SURFACE & MINERALS)

PROPOSED
INJECTION
WELL

OPERATOR N/A

SURFACE INTERNATIONAL METAL COMPANY, INC.
MINERALS SAME

WELL NO. 1

ELEVATION 445.6

COUNTY BUTLER

KENTUCKY

DATE DECEMBER 12, 1990

SCALE 1" = 200'

SURVEYOR: MARK P. JOHNSON

11074 ROCHESTER ROAD

ROCHESTER, KY 42273 (502) 934-5301

I HEREBY CERTIFY THAT THE ABOVE PLAT IS ACCURATE AND
SATISFIES THE REQUIREMENTS OF 805 KAR 1:030 TO THE BEST
OF MY KNOWLEDGE AND BELIEF.

Mark P. Johnson Ky Reg. 22557 12-12-90
KY REG. LAND SURVEYOR NO. 22557

KY REG. ENGINEER NO.

SUMMARY

IMCO Recycling Inc. was granted a permit on October 9, 1990 to construct a Class I non-hazardous industrial liquid disposal well at its plant near Morgantown, Butler County, Kentucky.

The Class I injection well was constructed during the period August 1991-October 1992.

During the construction, due to technical difficulties, IMCO applied for two permit modifications which were granted. The construction of the well was completed at the end of September 1992 and the Mechanical Integrity Test on the IMCO injection well was performed on October 9, 1992 in the presence of a U.S. EPA Region IV representative. The construction and operation chronology of the IMCO injection well is presented in Exhibit 1.

The IMCO injection well was drilled to 6,450 feet depth and completed as an openhole in the Knox Dolomite from 4,703 to 6,450 feet. The lowermost USDW (Underground Source of Drinking Water) is encountered at a depth of 210-260 feet in Pennsylvanian sandstone. The surface casing is set and cemented at a depth of 471 feet to protect USDW sources. The long string casing is set and cemented at a depth of 4,703 feet. The injection is through tubing and injection packer.

The injection well has been operating without any problems since October 1992. During this operation period, only the injection pump and some of the recorders have been exchanged with new ones. A total of 49,881,867 gallons of fluid has been injected as of December 2000. Quarterly reports were provided to U.S. EPA Region IV.

A Mechanical Integrity Test (MIT) was conducted on October 28, 1997 in the presence of a U.S. EPA Region IV representative and the external and internal integrity of the IMCO well were confirmed.

The enclosed document is prepared in accordance with permit conditions and presents all information and construction procedures for the injection well. A copy of the permit with the modifications is enclosed after the list of attachments, appendices and figures.

EXHIBIT 1

IMCO RECYCLING INC.
MORGANTOWN, KENTUCKY
INJECTION WELL

Construction Chronology

| | |
|-----------------------------------|--|
| August 9-10, 1991 | Move Drilling Rig and set up. |
| August 11-12, 1991 | Drilled 17 1/2" hole to 42 feet and set up 13 3/8" conductor pipe with 100 sacks of Class "A" cement. |
| August 12-13, 1991 | Drilled 12 1/4" hole to 471. Run SP-Induction Electric Log. Set 475 feet 9 5/8" K-55 casing (36 lb/ft) with 300 sacks of Class "A" cement including 4% calcium chloride. |
| August 13-16, 1991 | Drilled 8 3/4" hole to 2,526 feet depth. |
| August 17-21, 1991 | Drilled 7 7/8" hole to 4,000 feet depth. |
| August 22, 1991 | Run Cement Bond Log, Dual Induction, Gamma Ray, Compensated Density and Neutron, and Digital Sonic Logs. Set 7" K-55 casing (23 lb/ft) at 2,542 feet with 450 sacks of Class "A" cement. |
| August 23-25, 1991 | Move drilling rig out. |
| August 26, 1991 | Move workover rig on location. |
| August 27-29, 1991 | Drill cement and packer shoe out. |
| August 30-31, 1991 | Cleaned the well with 2% KCl water. Run Cement Bond and Evaluation Logs and Formation Tester. |
| September 3-4, 1991 | Test the well and acidize with 3,000 gallons of 15% HCl. Test again, low injectivity potential. |
| September 5 - October 15, 1991 | Evaluated different options for completing the well and decision was made to drill deeper into the Knox Dolomite. New permits were obtained from U.S. EPA and Kentucky Oil and Gas Division. |

| | |
|----------------------------------|--|
| October 16-18, 1991 | Move drilling rig on location and rig up. |
| October 19- November 4, 1991 | Drilled 6 1/8" hole to 5,872 feet depth. |
| November 4-5, 1991 | Run SP-Dual Induction, Gamma Ray and Density-Neutron Logs. Run DST #1. |
| November 6-7, 1991 | Run DST #2 and #3 and re-run DST #1. |
| November 8-14, 1991 | Drill 6 1/8" hole from 5,872 to 6,450 feet. Run SP-Dual Induction, Gamma Ray and Density-Neutron Logs. |
| November 15, 1991 | Run DST #4. |
| November 16-17, 1991 | Moved out the drilling rig. |
| November 16-21, 1991 | Got approval for completion procedures from U.S. EPA and Kentucky Oil and Gas Division. |
| November 22-23, 1991 | Move workover rig on location and rig up. |
| November 24-25, 1991 | Clean well out. |
| November 26, 1991 | Run 4 1/2" K-55 casing liner (10.5 lb/ft) from 2,300 to 4,703 feet. Used Baker Hyflo "III" liner hanger. Cemented the casing with 650 sacks of Class "A" cement. |
| November 27- December 2, 1991 | Wait on cement to set and harden. |
| December 3, 1991 | Start drilling cement and packer shoe with 3 7/8" bit. |
| December 4, 1991 | Mechanical problems. |
| December 5-6, 1991 | Drilled down to 4,702 feet. Having problem drilling the packer shoe. Having trouble with hydraulic system. |
| December 7, 1991 | Tripped out and the cones on bit were gone. |
| December 9, 1991 | Tried to fish the cones out. No success. Put flat bottom mil and trip in the hole. |

| | |
|----------------------|--|
| December 10-11, 1991 | Milled at the bottom (4,702') and trip out, the mill was worn out. |
| December 12, 1991 | Run magnet again and recovered two cones and three shanks and metal cuttings. Run impression cone and it came out clean. Trip in with a new bit. |
| December 13, 1991 | Drilled the packer shoe and some very hard cement and discovered the cement leaked below the packer shoe. |
| December 14-18, 1991 | Drilled cement to 5,115 feet. |
| December 19-27, 1991 | Repair the swivel and gear box of the rig. |
| December 28-29, 1991 | Cleaned the well and the mud out. Swabbed the well. |
| December 30-31, 1991 | Run injection test. The result was 10-14 gallons per minute with 1,000 psi wellhead pressure. |
| January 2, 1992 | Swab the well and pull out tubing. |
| January 3, 1992 | Run Temperature Log and hit bridge at 5,980 feet. Trip in with bit, hit first bridge at 5,307.45' and second one at 5,987.35'. Drilled the bridges and cleaned the well, circulate for 7 hours for extra cleaning at total depth. |
| January 4, 1992 | Swabbed the well for 8 hours. Pulled out tubing. |
| January 5-6, 1992 | Run Differential Temperature Log from 6,457 to 2,300 feet. Run Cement Bond Log for 4 1/2" casing from 4,705 to 2,300 feet and Gamma Ray Log from 6,457 to 4,700 feet. Start perforating the porous zones with 100-gram shots. Perforated zones: 6432-38', 6420', 6402-4, 6358-74, 6315-30, 6230-52, 6182-88, 6128--38, 6074-84, 6026-34, 5988-94, 5910-16, 5842-66, 5806-10. The hole bridged at 5305 feet again, the tool could not go through. Thus could not perforate the zones in between 5300-5800 feet depth. Then perforated these zones: 5148-72, 4996-5024, 4894-4904, 4834-60. Trip in with bit to clean the hole. Cleaned the hole and tripped out. |
| January 7, 1992 | |

| | |
|-----------------------------|---|
| January 8-10, 1992 | Run Caliper Log in the open hole. Perforated the following zones:: 5732-38, 5712-24, 5680-90, 5658-70, 5612-32, 5570-88, 5534-52, 5464-72, 5398-5406, 5366-70. |
| January 11, 1992 | Trip in with the bit. Clean the hole to total depth and circulate four hours for extra cleaning. Pull out to 5150 feet depth and circulate hole for two more hours. |
| January 15, 1992 | Trip in with packer and set it. Swab the well. Connect acid line and tried to acidize, but some pipes were leaking. Pulled out and tested pipes for leaks. |
| January 16, 1992 | Trip in with packer and set it. Well treated with 15,000 gallons of HCl acid (28 %) in five stages. |
| January 17, 1992 | Trip in with bit and clean hole out. Trip out. |
| January 20, 1992 | Trip in with packer and set it. Run injection test and Tracer Log. |
| February 4-5, 1992 | Trip in with bit and clean the hole at total depth and pull out. |
| February 18-October 1, 1992 | Run tubing in with retrievable packer, set packer, pump annulus fluid with corrosion inhibitor and test the annulus with 1000 psi pressure, packer hold. |
| October 9, 1992 | Installation of surface facilities and pump system. |
| October 10, 1992 | Conduct Mechanical Integrity Test in the presence of a U.S. EPA Region IV Representative. The test was successful. |
| October 28, 1997 | Officially started operation and injecting. |
| | Conduct Mechanical Integrity Test in the presence of U.S. EPA Region IV representative (Mr. David Hayes). The test was successful. |

LIST OF ATTACHMENTS, APPENDICES AND EXHIBITS

- A - Area of Review
- B - Maps of Wells/Area and Area of Review
- C - Corrective Action Plan and Well Data
- D - Maps and Cross-Sections of USDW's
- E - Not Applicable
- F - Maps and Cross-Sections of Geologic Structure of Area
- G - Not Applicable
- H - Operating Data
- I - Formation Testing Program
- J - Stimulation Program
- K - Injection Procedures
- L - Construction Procedures
- M - Construction Details
- N - Not Applicable
- O - Plans for Well Failures
- P - Monitoring Program
- Q - Plugging and Abandonment Plan
- R - Necessary Resources (Financial)
- S - Not Applicable
- T - Existing EPA and State Permits
- U - Description of Business

APPENDICES

- Appendix A - Copies of Well Reports (Previously submitted and thus not included)
- Appendix B - Chemical Analysis Report of Solid Waste and Leachate
- Appendix C - Copy of Property Deed
- Appendix D - Electric Logs (Previously submitted and thus not included)
- Appendix E - Drill Stem Tests (DST) results, formation fluid analytical reports(Previously submitted and thus not included)
- Appendix F - Acid Job and Injection Test Data (Previously submitted and thus not included)
- Appendix G - Drilling Records (Previously submitted and thus not included)

EXHIBITS

- Exhibit 1 - Construction Chronology
- Exhibit H-1 - Annulus Fluid Corrosion Inhibitor Data
- Exhibit L-1 - Surface (9 5/8") and Long String (7") Casing Purchase Tickets
- Exhibit L-2 - Liner Casing (4 1/2") Tally and Purchase Tickets
- Exhibit L-3 - Liner Hanger and Hanger Job Data
- Exhibit L-4 - Tubing (3 1/2" and 2 7/8") Tally and Purchase Tickets
- Exhibit L-5 - Injection Packer Data
- Exhibit L-6 - Casing Cementing Job Data and U.S. EPA Inspector's Reports (Conductor Pipe, Surface Casing, Long String and Liner)
- Exhibit L-7 - Annulus and Packer Pressure Test Data

LIST OF FIGURES

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|----------|---|
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| Fig. B-2 | Detailed topographic map of IMCO Morgantown plant |
| Fig. D-1 | Fresh saline water interface contour map of Butler County, Kentucky |
| Fig. D-2 | Map of flood prone areas in the vicinity of IMCO site |
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| Fig. L-1 | Scaled subsurface well construction |
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| Fig. U-1 | Flow chart of plant operations, IMCO Recycling Inc., Morgantown, Kentucky |



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

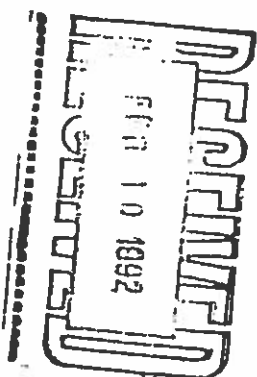
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

FEB 03 1992

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

REF: 4WM-GP

Mr. Thomas Rogers
IMCO Recycling, Inc.
P. O. Box 1070
Sapulpa, Oklahoma 74067



Re: Modification of UIC Permit No. KYI0429
Permit Effective: October 9, 1990
Modification Effective: FEB 04 1992

Dear Mr. Rogers:

In accordance with 40 C.F.R. \$144.41 and as per your request of January 23, 1992, the subject permit is hereby modified to reflect changes in the maximum injection pressure. Enclosed is the revised Underground Injection Control (UIC) permit page with the changes as indicated in your letter. Attach the modification to your permit. Please be informed that under the provisions of 40 C.F.R. \$144.41, this is considered a minor modification and is therefore not subject the draft permit, comment period and public notice requirements as contained in 40 C.F.R. Part 124. If you have any questions, please contact William Mann of my staff at (404) 347-3379.

Sincerely yours,

Allen E. Antley for
W. Ray Cunningham, Director
Water Management Division

Enclosure

MODIFICATION

TO

U. S. ENVIRONMENTAL PROTECTION AGENCY
UNDERGROUND INJECTION CONTROL PERMIT
AUTHORIZATION TO OPERATE A CLASS I INJECTION WELL
EPA UIC PERMIT NUMBER KY10429

Pursuant to the Underground Injection Control regulations of the U. S. Environmental Protection Agency codified at Title 40 of the Code of Federal Regulations, Parts 124, 144, 146 and 147, UIC Permit Number KY10429 issued to

IMCO Recycling, Inc.
P. O. Box 1070
Sapulpa, Oklahoma 74067

is hereby modified for the following Class I disposal injection well:

IMCO Injection Well #1
IMCO Morgantown Plant
Butler County, Kentucky
Carter Coordinate 14-I-34 2340' FSL x 160' FEL

This modification is in accordance with the limitations, monitoring requirements and other conditions set forth herein. This permit modification consists of this cover sheet and Part I, Page 3.

All references to Title 40 of the Code of Federal Regulations are to regulations that are in effect on the date that this permit modification becomes effective.

This permit modification shall become effective on FEB 04 1992.

This permit modification shall be attached to the original permit and is hereby made a part thereof. This permit modification shall remain in full force and effect during the operating life of the well, unless the permit is otherwise modified, revoked and reissued, terminated, or a minor modification is made as provided at 40 C.F.R. §§144.39, 144.40 and 144.41.

FEB 04 1992

Date

W. Ray Cunningham, Director
Water Management Division
U. S. Environmental Protection Agency
Region IV

- (ii) The permittee has not received, within thirteen (13) days of the date of the Director's receipt of the notice required above, notice from the Director of his or her intent to inspect or otherwise review the new injection well, in which case prior inspection or review is waived and the permittee may commence injection.

- (b) The permittee has demonstrated to EPA that the injection well has mechanical integrity, and has submitted the reports as specified in Part I, Section A, item 3.

SECTION B. OPERATING REQUIREMENTS

1. Injection Operation

Beginning on the date that Part I, Section A, item 4, is completed and lasting through the term of this permit, the permittee is authorized to inject only saltwater leachate from the solid waste landfill collected in a retention pond located on the plant site and runoff water from the IMCO plant facilities in Morgantown, Kentucky.

- (a) Injection shall be limited to the undifferentiated formations of Devonian-Silurian-Ordovician-Cambrian Systems in the interval between 4705 feet and 6450 feet below land surface.

(b) Injection Pressure Limitation

- (i) Maximum injection pressure, measured at the wellhead, shall not exceed 2700 psig unless IMCO performs an EPA approved step-rate injection test.

- (ii) Injection at a pressure which initiates or propagates fractures in the confining zone or causes the movement of injection or formation fluids into an underground source of drinking water is prohibited.

- (iii) Injection between the outermost casing protecting underground sources of drinking water and the well bore is prohibited.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

DEC 6 1991

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

REF: 4WM-GP

Mr. Thomas W. Rogers
Senior Vice-President
IMCO Recycling, Inc.
P. O. Box 1070
Sapulpa, Oklahoma 74067

Re: Final Modification of UIC Permit No.: KYI0429
Permit Effective: October 9, 1990
Modification Effective: NOV 29 1991
Permit Writer: William Mann

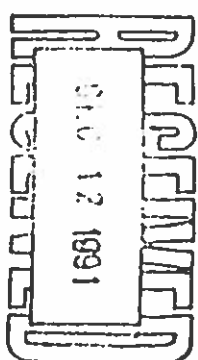
Dear Mr. Rogers:

Enclosed is the modification of the Underground Injection Control (UIC) permit referenced above. This action constitutes the U. S. Environmental Protection Agency's final permit decision in accordance with 40 C.F.R. §124.15(a). Please replace your existing UIC permit page(s) with the corresponding modified page(s). Under 40 C.F.R. §124.19, any person who filed comments on the draft modification or participated in the public hearing may contest this decision by petitioning the Administrator to review any condition of the modification. In this case, since no public hearing was held and no comments were filed during the public notice period, no appeal may be taken regarding this decision. Pursuant to 40 C.F.R. §124.15(b) this permit modification will be effective as specified in the permit modification. Information on legal matters may be obtained by contacting Ms. Melissa Heath, Assistant Regional Counsel, at (404) 347-3777.

Sincerely yours,

W. Ray Cunningham
W. Ray Cunningham, Director
Water Management Division

Enclosure



MODIFICATION

TO

U. S. ENVIRONMENTAL PROTECTION AGENCY
UNDERGROUND INJECTION CONTROL PERMIT
AUTHORIZATION TO OPERATE A CLASS I INJECTION WELL
EPA UIC PERMIT NUMBER KYI0429

Pursuant to the Underground Injection Control regulations of the U.S. Environmental Protection Agency codified at Title 40 of the Code of Federal Regulations, Parts 124, 144, 146 and 147, UIC Permit Number KYI0429 issued to

IMCO Recycling, Inc.
P. O. Box 1070
Sapulpa, Oklahoma 74067

is hereby modified for the following Class I disposal injection well:

IMCO Injection Well #1
IMCO Morgantown Plant
Butler County, Kentucky
Carter Coordinate 14-I-34, 2340' FSL, 160' FEL

This modification is in accordance with the limitations, monitoring requirements and other conditions set forth herein. This permit modification consists of this cover sheet; Part I, Pages 1, 2, 3, 4, 5, 6, and 7.

All references to Title 40 of the Code of Federal Regulations are to regulations that are in effect on the date that this permit modification becomes effective.

This permit modification shall become effective on NOV 29 1991.

This permit modification shall be attached to the original permit and is hereby made a part thereof. This permit modification shall remain in full force and effect during the operating life of the well, unless the permit is otherwise modified, revoked and reissued, terminated, or a minor modification is made as provided at 40 C.F.R. §§144.39, 144.40 and 144.41.

NOV 29 1991

Date

W. Ray Cunningham
W. Ray Cunningham, Director
Water Management Division
U.S. Environmental Protection Agency
Region IV

PART I

WELL SPECIFIC CONDITIONS

SECTION A. CONSTRUCTION REQUIREMENTS

1. Casing and Cementing

The permittee shall case and cement the well and maintain all casing and cement so as to prevent the movement of fluids into or between underground sources of drinking water. The casing and cement used in the construction of the well shall be designed for the life expectancy of the well. Construction of this well shall be performed as specified in Attachments L & M of the permit application and any subsequent EPA approved amendments made to Attachments L & M.

2. Tubing and Packer

Injection may only take place through tubing with a packer set within the casing no higher than 50 feet above the base of the deepest casing. The tubing and packer shall be maintained in a manner which is compatible with the injection operation specified in Part I, Section B, and which prevents the movement of fluids into or between underground sources of drinking water.

3. Logs, Tests and Reports

The following logs, tests and reports shall be prepared and submitted to EPA:

- (a) A demonstration of the mechanical integrity of the well is required before injection can be authorized. The demonstration will consist of a pressure test on the tubing/casing annulus to at least 300 psig with less than 3% pressure loss in 30 minutes. The permittee shall contact EPA to arrange a date to conduct this test. A representative of EPA will be present to witness this test.

- (b) A composite copy of a Gamma Ray-Self Potential-Dual Induction-SFL-Caliper Log from TD to surface.

- (c) A composite copy of a Gamma Ray-Caliper-Lithodensity-Compensated Neutron Log from TD to the base of the surface casing.
- (d) A fracture identification log from the base of the deepest casing to 500 ft. above the base of the deepest casing.
- (e) A lithology log from surface to TD based on cuttings taken every ten (10) feet.
- (f) A cement bond log from 450 ft. to surface; a cement bond log from 2485 ft. to 450 ft. and a cement bond log from the base of the liner to 2485 ft.
- (g) Copies of all cement invoices indicating volume of cement pumped, class of cement, cement additives, etc.
- (h) Core analysis on any conventional or sidewall cores.
- (i) Fluid analysis of the injection zone. The analysis shall include pH, total dissolved solids, specific gravity, barium, calcium, total iron, magnesium, sodium, bicarbonate, carbonate, chloride, sulfate, carbon dioxide, dissolved oxygen, and hydrogen sulfide.
- (j) The permittee shall prepare a report, including procedures and results of the logging and testing programs. Each log shall include a written interpretation prepared by a knowledgeable log analyst. The report must be submitted in accordance with Part I, Section A, item 4, and shall be signed in accordance with Part II, Section E, item 11, of this permit.

4. Commencing Injection

The well authorized by this permit may not commence injection until:

- (a) Construction is complete, and the permittee has submitted to the Director, by certified mail with return receipt requested, a notice of completion using EPA Form 7520-10, and either:
 - (i) The Director has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit; or

- (ii) The permittee has not received, within thirteen (13) days of the date of the Director's receipt of the notice required above, notice from the Director of his or her intent to inspect or otherwise review the new injection well, in which case prior inspection or review is waived and the permittee may commence injection.

- (b) The permittee has demonstrated to EPA that the injection well has mechanical integrity, and has submitted the reports as specified in Part I, Section A, item 3.

SECTION B. OPERATING REQUIREMENTS

1. Injection Operation

Beginning on the date that Part I, Section A, item 4, is completed and lasting through the term of this permit, the permittee is authorized to inject only saltwater leachate from the solid waste landfill collected in a retention pond located on the plant site and runoff water from the IMCO plant facilities in Morgantown, Kentucky.

(a) Injection Zone

Injection shall be limited to the undifferentiated formations of the Devonian-Silurian-Ordovician-Cambrian Systems in the interval between 2485 feet and 8000 feet below land surface.

(b) Injection Pressure Limitation

- (i) Maximum injection pressure, measured at the wellhead, shall not exceed 815 psig unless IMCO performs an EPA approved step-rate injection test or installs a liner below 2485 feet.

- (ii) Injection at a pressure which initiates or propagates fractures in the confining zone or causes the movement of injection or formation fluids into an underground source of drinking water is prohibited.

- (iii) Injection between the outermost casing protecting underground sources of drinking water and the well bore is prohibited.

2. Annulus Operation

The annulus between the tubing and the long-string casing shall be filled with brine or other fluid as approved by the Director. The annulus pressure shall be maintained at 10 psig.

The annulus shall be monitored with a gauge designed to indicate both a vacuum (below atmospheric) and positive pressure (above atmospheric). The permittee shall comply with Part I, Section B, item 3, when a change in the annulus pressure of 25 psig occurs. The permittee shall provide an explanation to the Director for the change in pressure and measures that will be taken to restore annulus pressure to achieve compliance with this Section. If the cause of annulus pressure change is not corrected within 48 hours, the permittee shall cease injection unless such order to cease operation is waived by the Director.

3. Loss of Mechanical Integrity During Operation

The permittee shall cease injection if a loss of mechanical integrity as defined at 40 C.F.R. §146.8 becomes evident during operation. Operation shall not be resumed until the permittee has complied with the provisions of Part II, Section G, of this permit regarding mechanical integrity demonstration and testing.

The permittee shall notify the Director of the loss of mechanical integrity in accordance with the reporting procedures in Part II, Section E, item 12(d).

SECTION C. MONITORING REQUIREMENTS

1. Sampling and Analysis Methods

Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. Grab samples shall be used for the laboratory analysis of the physical and chemical characteristics as specified in Part I, Section C, item 3(a). Test methods and procedures shall be as specified at 40 C.F.R. §136.3 or 40 C.F.R. Part 261, Appendix III. When the analytical method for a particular parameter is not specified at either 40 C.F.R.

\$136.3 or 40 C.F.R. Part 261, Appendix II, the permittee must obtain the Director's approval of the method used. The permittee shall identify the types of tests and methods used to generate all monitoring data. Reports to be generated from monitoring data are specified in Part I, Section D.

2. Injection Operation Monitoring

The permittee shall monitor the operation of the injection well as follows:

| <u>Parameter</u> | <u>Monitoring Frequency</u> |
|---|-----------------------------|
| Injection Pressure (psig) at Wellhead | Continuous |
| Annulus Pressure (psig) at Wellhead | Continuous |
| Flow Rate (barrels/day) of Injected Fluid | Continuous |
| Cumulative Volume (barrels) of Injected Fluid | Continuous |
| Pressure buildup in the Injection Zone | Annually |

3. Injection Fluid Analysis

The permittee shall conduct an injection fluid analysis at least once every three (3) months and whenever changes are made to the injection fluid. Analyses shall be made beginning within three (3) months from the effective date of this permit, or three (3) months from the most recent analysis, whichever is later. An analysis must include:

- (a) A list of all chemicals and their composition used for any well stimulation and fracturing during that sampling period; and a list of any additives used and their chemical composition, including any inhibitors used to prevent scaling, corrosion, or bacterial growth. These lists should indicate the brand name of the product and the manufacturer.

(b) pH, total dissolved solids, specific gravity, barium, calcium, total iron, magnesium, sodium, bicarbonate, carbonate, chloride, sulfate, carbon dioxide, dissolved oxygen, and hydrogen sulfide.

(c) Other physical and chemical characteristics of the injection fluid as required by the Director.

SECTION D. REPORTING REQUIREMENTS

1. Reports on Well Tests and Workovers

Within thirty (30) days after the completion of the activity, the permittee shall report to the Director the results of the following:

- (a) Mechanical integrity tests, other than those specified in Part I, Section A, item 3; and
- (b) Any well workover, logging or other test data, other than those specified in Part I, Section A, item 3, revealing downhole conditions.

2. Reporting of Monitoring Results

Monitoring results, as specified in Part I, Section C, shall be reported quarterly on EPA Form 7520-11 and must be postmarked by the 28th day of the month following the first quarter after the effective date of this permit.

Copies of the monitoring results required by Part I and all other reports required by Part II shall be submitted to the Director at the following address:

U. S. Environmental Protection Agency
Region IV, Water Management Division
Ground-Water Protection Branch
Underground Injection Control Section
345 Courtland Street, NE
Atlanta, Georgia 30365

3. Reporting of New Wells Drilled Within the Area of Review (AOR)

Within ten (10) days after spud date, the permittee shall report to the Director by certified mail, return receipt requested, the construction plans for any new well within the AOR of the permitted facility that will penetrate the confining zone or injection zone. The permittee shall provide information on proposed construction (including location and quantities of cement), location and depth. This requirement applies to any construction activity regardless of ownership of the well.

If the construction of the new well will not protect USDWs from contamination, the Director may terminate the permit under 40 CFR \$14.40(a)(3), if he or she determines that continued injection may endanger human health or the environment.

SECTION E. PLUGGING AND ABANDONMENT PLAN

Plugging and abandonment of the permitted injection well shall be in accordance with Part II, Section F, of this permit and 40 C.F.R. \$146.10.

The plugging of this injection well shall be performed in the manner described in Attachment Q of the permit application and any subsequent amendments made to Attachment Q.

PART II
GENERAL PERMIT COMPLIANCE

A. EFFECT OF PERMIT

The permittee is allowed to engage in underground injection in accordance with the conditions of this permit. The permittee, authorized by this permit, shall not construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR Part 142 or may otherwise adversely affect the health of persons. Any underground injection activity not specifically authorized in this permit is prohibited. Compliance with this permit does not constitute a defense to any action brought under the SDWA, or any other common or statutory law or regulation. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local law or regulations. Nothing in this permit shall be construed to relieve the permittee of any duties under applicable regulations.

B. PERMIT ACTIONS

1. Modification, Revocation, Reissuance and Termination. The Director may, for cause or upon request from the permittee, modify, revoke and reissue, or terminate this permit in accordance with 40 CFR §§ 144.12, 144.39, and 144.40, including but not limited to the following:

(a) Alterations. There are material and substantial alterations or additions to the permitted facility or activity which occurred after permit issuance which justify the application of permit conditions that are different or absent in this permit.

(b) Information. The Director has received information which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and would have justified the application of different permit conditions at the time of issuance.

- (c) New regulations. The standards or regulations on which the permit was based have been changed by promulgation of amended standards or regulations or by judicial decision after the permit was issued.
- (d) Compliance schedules. The Director determines good cause exists for modification of a compliance schedule, such as an act of God, strike, flood, or materials shortage or other events over which the permittee has little or no control and for which there is no reasonably available remedy.
- (e) Proposed transfer. The Director receives notification of a proposed transfer of the permit.
- (f) Noncompliance. Noncompliance by the permittee with any condition of the permit.
- (g) Relevant facts. The permittee's failure in the application or during the permit issuance process to disclose fully all relevant facts, or the permittee's misrepresentation of any relevant facts at any time.
- (h) Endangerment. A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination.

Also, the permit is subject to minor modifications for cause as specified in 40 CFR §144.41. The filing of a request for a permit modification, revocation and reissuance, or termination, or the notification of planned charges, or anticipated noncompliance on the part of the permittee does not stay the applicability or enforceability of any permit condition.

The submission of an updated application may be required prior to the Director granting a request for permit modification.

2. Transfer of Permits. This permit is not transferable to any person except after notice to and approval by the Director, and in compliance with the requirements and conditions of 40 CFR §144.38.

The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Safe Drinking Water Act.

This permit may be transferred to a new owner or operator by modification according to 40 CFR §144.41(d), if the Director determines that no other change in the permit is necessary, provided that a written agreement containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new permittee has been submitted to the Director.

C. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

D. CONFIDENTIALITY

In accordance with 40 CFR Part 2 and §144.5, any information submitted to EPA pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the validity of the claim will be assessed in accordance with the procedures in 40 CFR Part 2 (Public Information). Claims of confidentiality for the following information will be denied:

- 1) The name and address of the permittee;
- 2) Information which deals with the existence, absence or level of contaminants in drinking water.

E. DUTIES AND REQUIREMENTS

1. Duty to Comply. The permittee shall comply with all applicable UIC Program regulations and conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit issued in accordance with 40 CFR §144.34. Any permit noncompliance constitutes a violation of the SDWA and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application. Such non-compliance may also be grounds for enforcement action under RCRA.

2. Penalties for Violations of Permit Conditions. Any person who violates a permit requirement is subject to civil penalties, fines, and other enforcement action under the SDWA and may be subject to such actions pursuant to RCWA. Any person who willfully violates permit conditions may be subject to criminal prosecution.

3. Continuation of Expiring Permits.

- (a) Duty to Reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must submit a complete application for a new permit at least 180 days before this permit expires.
- (b) Permit Extensions. The conditions of an expired permit may continue in force in accordance with 5 U.S.C. 558(c) until the effective date of a new permit, if:
- (1) The permittee has submitted a timely application which is a complete application for a new permit; and
- (2) The Director, through no fault of the permittee, does not issue a new permit with an effective date on or before the expiration date of the previous permit, and
- (3) The new permit has not been denied, or if a denial has been appealed, final agency action has not occurred in accordance with 40 CFR §124.19(f)(1).
- (c) Effect. Permits continued under 5 U.S.C. 558(c) remain fully effective and enforceable.
- (d) Enforcement. When the permittee is not in compliance with the conditions of the expiring or expired permit the Director may choose to do any or all of the following:
- (1) Initiate enforcement action based upon the permit which has been continued;

(2) Issue a notice of intent to deny the new permit. If the permit is denied, the owner or operator would then be required to cease the activities authorized by the continued permit or be subject to enforcement action for operating without a permit;

(3) Issue a new permit under 40 CFR Part 124 with appropriate conditions; or

(4) Take other actions authorized by Underground Injection Control regulations.

(e) State Continuation. An EPA issued permit does not continue in force beyond its expiration date under Federal law if at that time a State has primary enforcement authority. A State authorized to administer the UIC program may continue either EPA or State-issued permits until the effective date of the new permits, if State law allows. Otherwise, the facility or activity is operating without a permit from the time of expiration of the old permit to the effective date of the State-issued new permit.

4. Need to Halt or Reduce Activity not a Defense. It shall not be a defense, for permittee in an enforcement action, that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

5. Duty to Mitigate. The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.

6. Proper Operation and Maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this permit.

7. Duty to Provide Information. The permittee shall furnish to the Director, within a time specified, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

8. Inspection and Entry. The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:

- (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this permit;
- (b) Have access to and copy, at reasonable times, any records that are kept under the conditions of this permit;
- (c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
- (d) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by SDWA, any substances or parameters at any location.

9. Records.

- (a) The permittee shall retain records and all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation and copies of all reports required by this permit for a period of at least five years from the date of the sample, measurement or report.
- (b) The permittee shall maintain records of all data required to complete the permit application form for this permit and any supplemental information submitted under 40 CFR §144.31 for a period of at least five years from the date the application was signed. These periods may be extended by request of the Director at any time.

- (c) The permittee shall retain records concerning the nature and composition of all injected fluids until three years after the completion of plugging and abandonment which has been carried out in accordance with the attached plugging and abandonment plan, and is consistent with 40 CFR §146.10.
- (d) The permittee shall continue to retain such records after the retention period specified by paragraphs (a) to (c) above, unless he delivers the records to the Director or obtains written approval from the Director to discard the records.
- (e) Records of monitoring information shall include:
 - (1) The date, exact place, and time of sampling or measurements;
 - (2) The individual(s) who performed the sampling or measurements;
 - (3) A precise description of both sampling methodology and the handling (custody) of samples;
 - (4) The date(s) analyses were performed;
 - (5) The names of individual(s) who performed the analyses;
 - (6) The analytical techniques or methods used; and
 - (7) The results of such analyses.
- 10. Monitoring. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. Monitoring results shall be reported at the intervals specified in Part I of this permit.
- 11. Signatory Requirements.
 - (a) All reports or other information, required to be submitted by this permit or requested by the Director, shall be signed and certified in accordance with 40 CFR §144.32, as follows:

- (1) For a corporation: by a responsible corporate officer. For the purpose of this permit, a responsible corporate officer means: (1) a president, secretary, treasurer or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy - or decision making functions for the corporation, or (2) the manager of one or more manufacturing, production or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding 25 million (in second quarter 1960 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporation procedures.
 - (2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
 - (3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official; or
 - (4) A duly authorized representative.
- (b) A person is a duly authorized representative only if:
- (1) The authorization is made in writing by a person described above;
 - (2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and
 - (3) The written authorization is submitted to the Director.
- (c) If an authorization under paragraph (b) above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a

new authorization satisfying the requirements of paragraph (b) of this section must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

- (d) Any person signing a document under paragraphs 11(a) or 11(b) of this Section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

12. Reporting Requirements.

- (a) Planned Changes. The permittee shall give written notice to the Director, as soon as possible, of any planned physical alterations or additions to the permitted facility.
- (b) Anticipated Noncompliance. The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
- (c) Compliance Schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 30 days following each schedule date.
- (d) Twenty-four Hour Reporting.
- (1) The permittee shall report to the Director any non-compliance which may endanger health or the environment. Any information shall be provided orally

within 24 hours from the time the permittee becomes aware of the circumstances. The following shall be included as information which must be reported orally within 24 hours:

(i) Any monitoring or other information which indicates that any contaminant may cause an endangerment to an underground source of drinking water.

(ii) Any noncompliance with a permit condition, or malfunction of the injection system, which may cause fluid migration into or between underground sources of drinking water.

(2) A written submission shall also be provided within five days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

(e) Other Non-Compliance. The permittee shall report all other instances of noncompliance not otherwise reported at the time monitoring reports are submitted. The reports shall contain the information listed in Part II, Section E, Item 12(d)(2) above.

(f) Other Information. When the permittee becomes aware that he failed to submit any relevant facts in the permit application or submitted incorrect information in a permit application or in any report to the Director, the permittee shall submit such facts or information within 10 days.

F. PLUGGING AND ABANDONMENT

1. Notice of Plugging and Abandonment. The permittee shall notify the Director no later than 45 days before conversion or abandonment of the well. The Director may allow a shorter notice period upon written request.

G. MECHANICAL INTEGRITY

1. Standards. All injection well(s) must have and maintain mechanical integrity consistent with 40 CFR §146.8.
2. Prohibition Without Demonstration. The permittee shall not commence or continue injection activity after the effective date of this permit unless the permittee has demonstrated that the well covered by this permit has mechanical integrity in accordance with 40 CFR §146.8 and the permittee has received written notice from the Director that such demonstration is satisfactory.

3. Subsequent Mechanical Integrity Demonstrations. A demonstration of mechanical integrity in accordance with 40 CFR §146.8 shall be made no later than five years from the date of the last approved demonstration. Mechanical integrity shall also be demonstrated any time the tubing is removed from the well, the packer is reset, or a loss of mechanical integrity becomes evident during operation. Furthermore, the Director may by written notice require the permittee to demonstrate mechanical integrity at any time. The permittee shall notify the Director of his intent to demonstrate mechanical integrity at least 30 days prior to such demonstration. The Director may allow a shorter time period if it would be sufficient to enable EPA to adequately respond. The permittee shall report the results of a mechanical integrity demonstration within 90 days after completion and in accordance with Part II, Section E, item 11.

4. Loss Of Mechanical Integrity. If the permittee or the Director finds that the well fails to demonstrate mechanical integrity during a test, or a loss of mechanical integrity as defined by 40 CFR §146.8 becomes evident during operation, the injection operation shall be halted immediately and shall not be resumed until the Director gives approval to recommence injection.

5. Test Methods to be Used for Mechanical Integrity Test (MIT). A plan for logging and testing the well for mechanical integrity shall be prepared and submitted for the Director's approval at least 60 days prior to each proposed MIT demonstration date. The Director may allow a shorter time period if it would be sufficient to enable EPA to adequately respond.

The plan shall propose logs and tests specified in 40 CFR §146.8 (as amended from time to time by EPA to include additional approved logs and tests, as published in the Federal Register). The plan shall also propose standards that will be used for evaluating the results of logging and testing. Mechanical integrity will be confirmed if the well logs and test data meet or exceed the standards approved as a result of the Director's review of the plan.

H. FINANCIAL RESPONSIBILITY

1. Financial Responsibility. The permittee shall maintain continuous compliance with the requirement to maintain financial responsibility and resources to close, plug, and abandon the underground injection well(s). The permittee shall not substitute an alternative demonstration of financial responsibility from that which the Director has approved, unless he has previously submitted evidence of that alternative demonstration to the Director and the Director notifies him that the alternative demonstration of financial responsibility is acceptable. The Director may, on a periodic basis, require the holder of a permit to revise the estimate of the resources needed to plug and abandon the well to reflect inflation of such costs and a revised demonstration of financial responsibility, if necessary.

2. Insolvency. In the event of:

- (a) the bankruptcy of the trustee or issuing institution of the financial mechanism, or
- (b) suspension or revocation of the authority of the trustee institution to act as trustee, or
- (c) the institution issuing the financial mechanism loses its authority to issue such an instrument, the permittee must notify the Director, within ten (10) business days. The owner or operator must establish other financial assurance or liability coverage acceptable to the Director, within 60 days after such an event.

An owner or operator must also notify the Director by certified mail of the commencement of voluntary OR INVOLUNTARY proceedings under Title 11 (Bankruptcy), U.S. Code naming the owner or operator as debtor, within 10 business days after the commencement of the proceeding. A guarantor of a corporate guarantee must make such a notification if he is named as debtor, as required under the terms of the guarantee.

I. DEFINITIONS

All terms used in this permit, if not specifically defined in the permit, are defined at 40 C.F.R. Parts 144, 145, 146 and 147.



ATTACHMENTS



ATTACHMENT A

AREA OF REVIEW

The area of review chosen for the IMCO injection well is a fixed radius of 1/4 mile from the well site. The well site and the area of review are shown on Figure B-1.

ATTACHMENT B
MAPS OF WELLS/AREA AND AREA OF REVIEW

Figure B-1 shows the location of the injection well, property line, the area of review and the 1-mile radius. The map also shows the strip mines (coal), gravel pits and wells drilled in the vicinity of the injection well. The IMCO plant and landfill facilities are built near and on an abandoned strip mine.

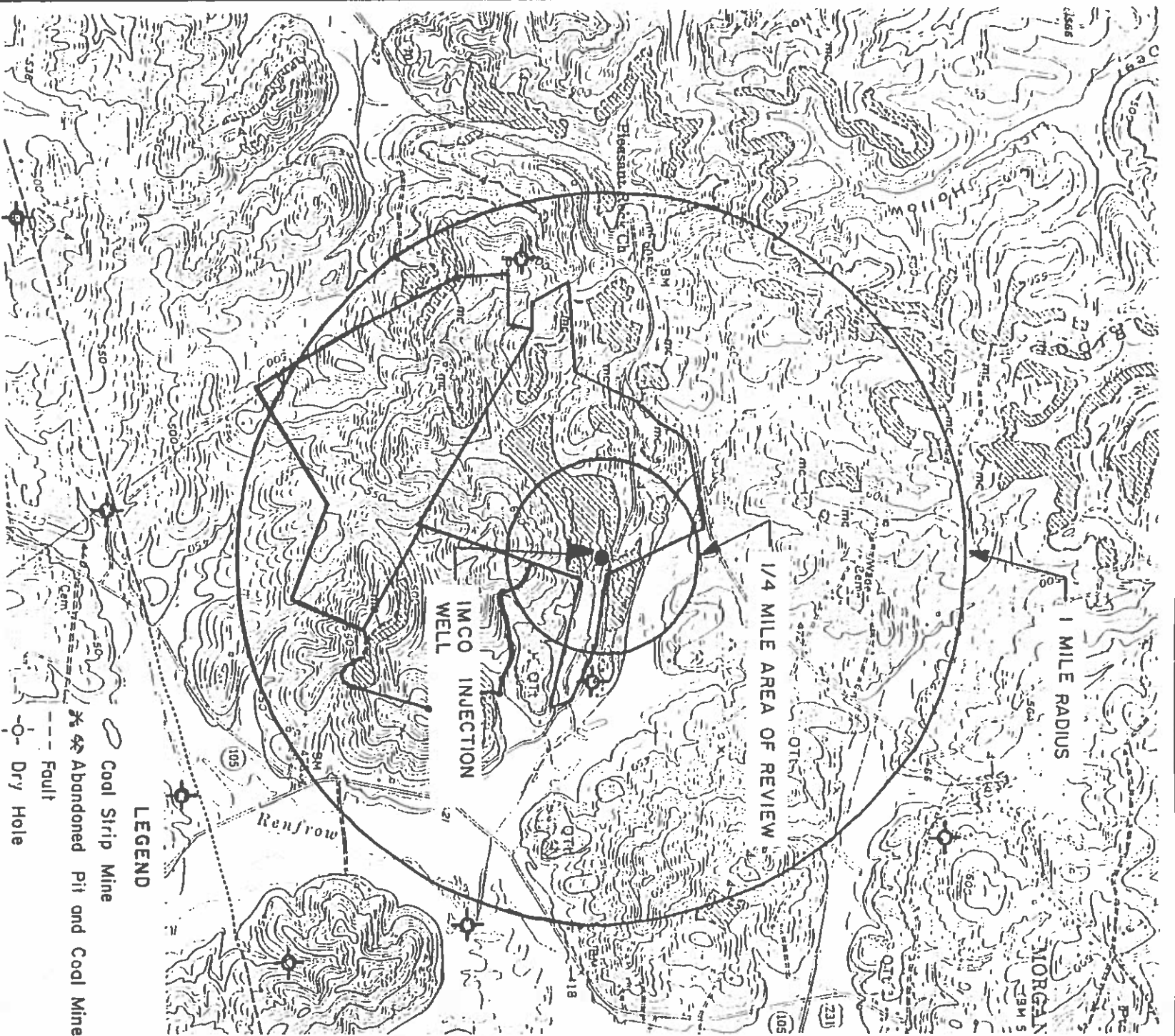
A possible fault is mapped about 1.5 miles south of the injection well (Figure B-1).

Two small streams are present within the area of review. One of these is to the north of the injection well and the other south of it. These two streams flow east and southeast to merge to Renfrow Creek.

No drinking water wells are located in the area of review. There are four drinking water wells in the 1/2-mile radius of the IMCO property. The data pertinent to these wells are shown below:

1. Exie Hawes, 1897 Rochester Road
 Located 1,800 feet north of the site
 Depth of the well: 25 feet
2. Casey Johnson, 437 Garden Camp Road
 Located 2,000 feet east-southeast of the site
 Depth of well: 38 feet
3. Hal and Betty Neal, P.O. Box 21
 Located 2,200 feet southeast of the site
 Depth of well: 75 feet
4. Henry Meredith, Jr., 403 Garden Camp Road
 Located 1,600 feet southeast of the site
 Depth of well: 120 feet

Figure B-2 shows a detailed topographic map of the IMCO property and the facilities. The plant site is located to the north of the property and two non-hazardous solid waste landfills are constructed in the south. The landfills have a double synthetic liner and both are equipped with a drain system, leachate collection system and leak detection system. The leachate from the landfills is collected in two ponds with synthetic liner (Figure B-2). Twelve groundwater monitor wells were installed for the landfills and leachate collection ponds; and recently (October 2000) seven of these wells were plugged and abandoned. These are shown on Figure B-2.



(FROM B. GLIDERSLEEVE, U.S.G.S. MORGANTOWN
QUADRANGLE, KENTUCKY, 60-1040, 1972)

MAP OF AREA OF REVIEW AND ITS
SURROUNDINGS

**A. & M. ENGINEERING AND
ENVIRONMENTAL SERVICES, INC.**
TULSA, OKLAHOMA

SCALE: 1" = 2000'

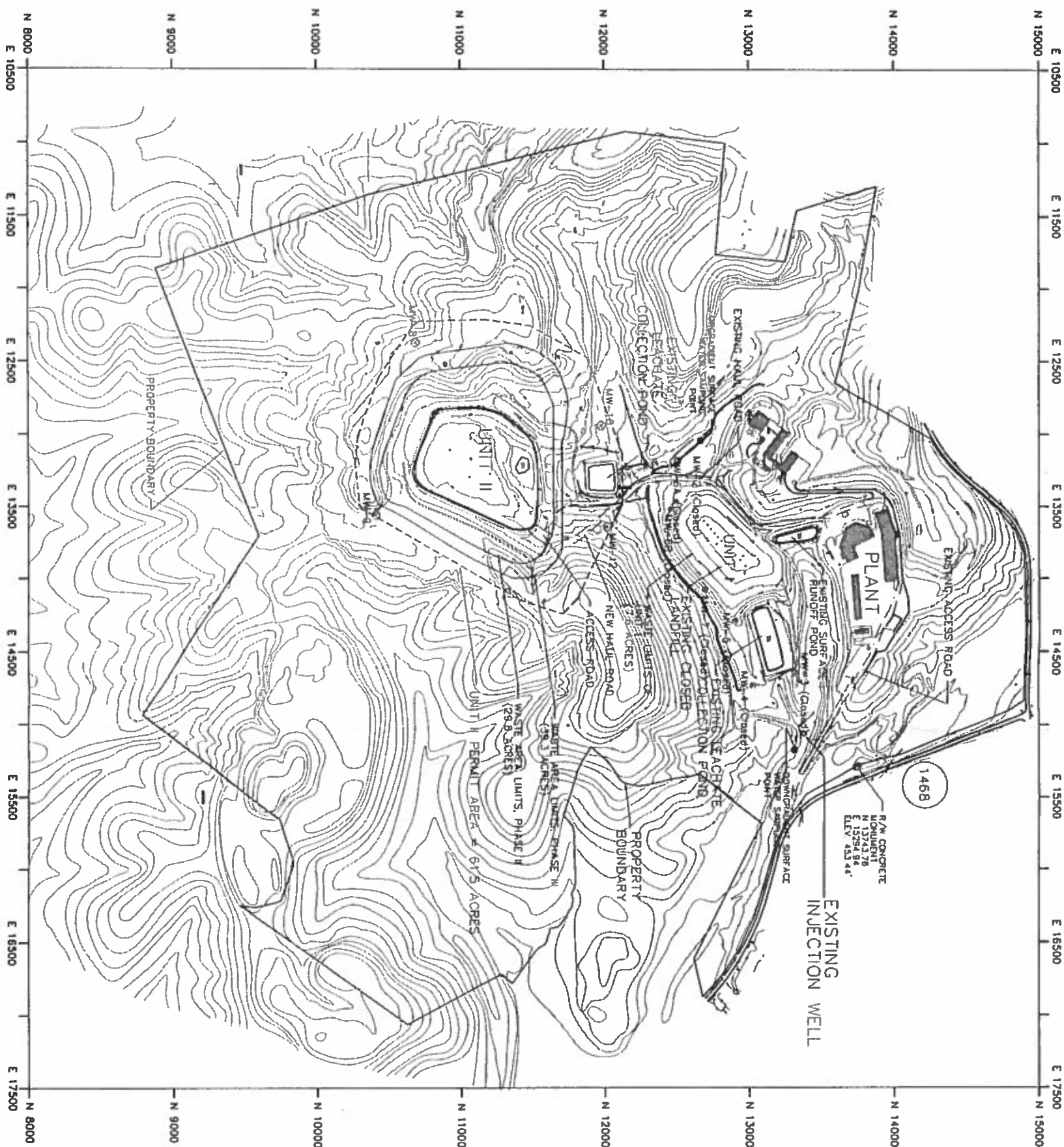
DATE

FIGURE B-1

APPROVED BY

DRAWN BY

DRAWING NO.



LEGEND

MW-8 MONITOR WELLS

EXISTING INJECTION WELL LOCATION

PROPERTY BOUNDARY

BONDED AREA PHASE II, (36.5 ACRES)

UNIT II LANDFILL PERMIT BOUNDARY

PHASE I, II AND III WASTE LIMITS

CONCRETE MONUMENT

10-FOOT CONTOUR INTERVAL

TOTAL PERMIT AREA

INCLUDES:
EXISTING HAUL ROAD
NEW HAUL ROAD
CELL B PERMIT AREA
EXISTING LEACHATE POND
INJECTION WELL
TOTAL PERMIT AREA = 68 ACRES

GENERAL NOTES

1. TOPOGRAPHIC MAP BASED ON AERIAL SURVEY BY GRW SURVEYS, INC. ON 12-14-1996.

2. MONITOR WELL NUMBER 7 IS A FACILITY GRID LOCAL CONTROL POINT BASED ON THE CONCRETE MONUMENT. FACILITY GRID COORDINATES OF MONITOR WELL NUMBER 7 ARE: N 12593.03

[illegible]

**A & M ENGINEERING AND
ENVIRONMENTAL SERVICES, INC.**

$$E_{\text{max}} = \frac{E_{\text{max}} \cdot C_{\text{max}}}{C_{\text{max}} + C_{50}}$$

SITE PLAN

**SOLID WASTE FACILITY DESIGN
CO MORGANTOWN, KENTUCKY PLANT**

INCO RECYCLING INC.

MORGANTOWN, KENTUCKY

| | | | | |
|------------------|---------|----------------|----------------|--------|
| APPROVED BY TAC | SCALE | PROJECT NUMBER | DRAWING NUMBER | P.L.V. |
| Date: 12-10-1998 | 1"=400' | 1175-004 | FIGURE B-2 | |



Wilson Jones

Quick Reference Index System

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ATTACHMENT C CORRECTIVE ACTION PLAN AND WELL DATA

No wells are present in the 1/4-mile radius area of review with the exception of the shallow (40' to 110' deep) monitor wells of the IMCO solid waste landfills.

In a 1-mile-radius area, there are two deep wells, but in 1.5-mile-radius, seven wells (Fig. B-1) These wells, drilled for oil and gas, are all dry and abandoned. The data from these wells are tabulated in Table C-1 and copies of the records are included as Appendix A. None of the wells penetrated the injection zone (Devonian-Silurian-Ordovician carbonates), and the confining zone (Devonian New Albany Shale).

The only well to penetrate the proposed injection zone is located about three miles northwest of the IMCO injection well in Section 9, 1-33, Butler County (G. Orange #1). This well is also dry and abandoned.

Therefore, there is no need for a corrective action plan.

TABLE C-1
LIST OF WELLS IN 1.5-MILE-RADIUS OF
IMCO INJECTION WELL
MORGANTOWN (BUTLER COUNTY), KENTUCKY

| Well Name | Location | Total Depth (ft.) | Drilling Date | Formation at TD | Status | Plugging |
|--------------------------|--------------------------------------|-------------------|---------------|---------------------|--------|----------|
| 1)Paul Ingram #1 | Sec.12, I-34, 2000' FNL, 2200'FWL | 1770 | 1976-78 | Mississippian Ls. | Dry | Yes |
| 2)Producers Pipe Line #1 | Sec.8, I-34, 1300' FSL, 750' FEL | 1544 | 1955-56 | Mississippian Ls. | Dry | Yes |
| 3)Forsythe-Nel #1 | Sec.12, I-34, 11950' FSL, 9310 FEL | 1114 | ? | Mississippian Ls. | Dry | Yes |
| 4)George Nelson #1 | Sec. 18, I-34, 9800' FSL, 8800' FEL | 1511 | 1956 | Mississippian Ls. | Dry | Yes |
| 5)George Nelson #1 | Sec.18, I-34, 8200' FSL, 11200' FEL | 934 | 1957 | Mississippian Sh-Ss | Dry | Yes |
| 6)Hopen Shearer #1 | Sec. 17, I-34 | 940 | ? | Mississippian Ls. | Dry | Yes |
| 7)Ruby Wade #1 | Sec.13, I-34, 14240' FSL, 12740' FEL | 850 | 1962 | Mississippian Ls. | Oil | ? |

ATTACHMENT D
USDW (Underground Sources of Drinking Water)

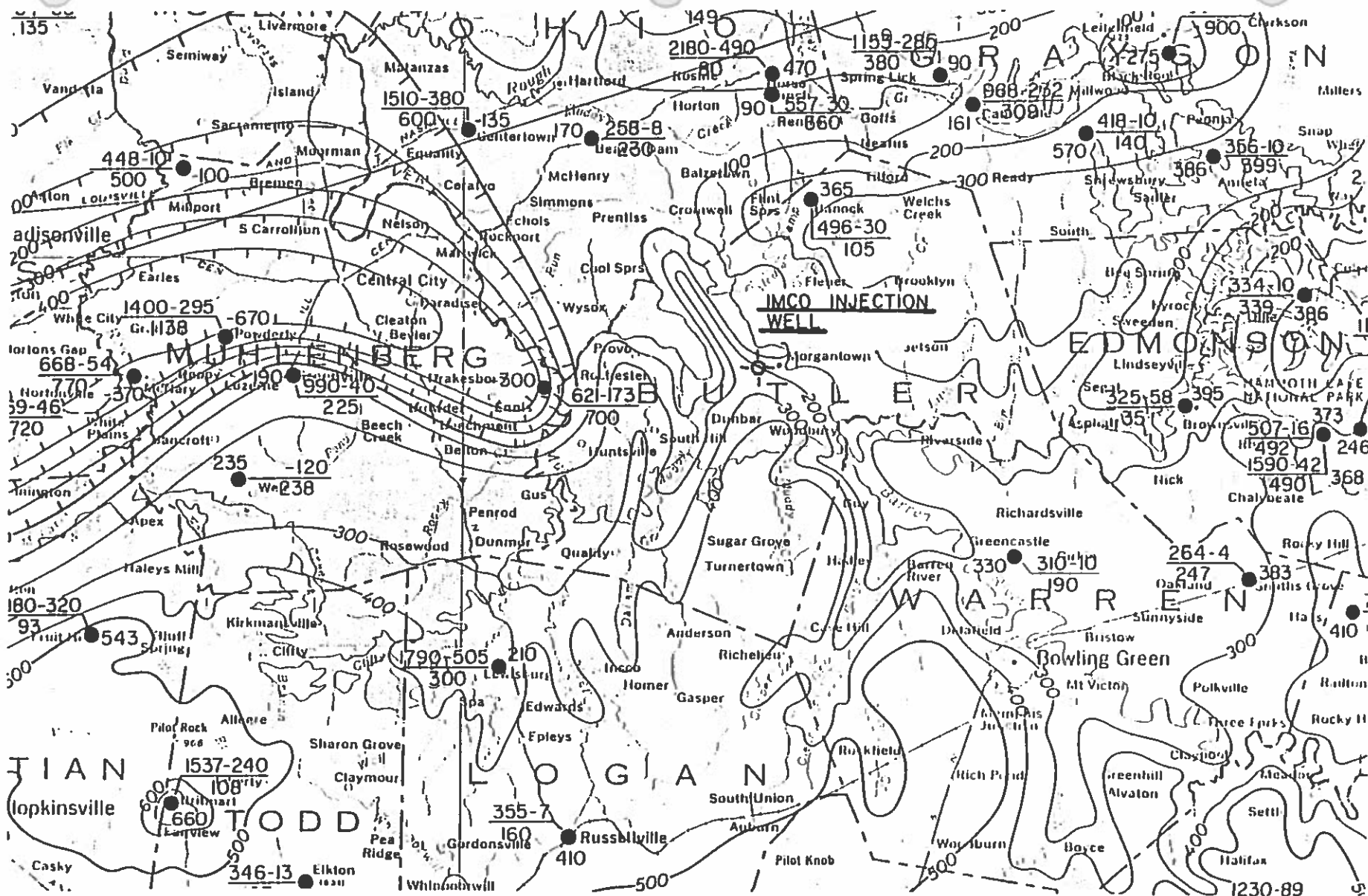
Drinking water sources in the vicinity of the IMCO site are the Pennsylvanian sandstone units and the alluvial deposits of the Green River and its tributaries.

Water-bearing Pennsylvanian sandstone units range in depth from 20 feet to 300 feet in the vicinity of the IMCO injection well. In the R. Wade #1 well (Section 13, I-34) located 2,000 feet east of the IMCO well, the water-bearing Pennsylvanian sandstones were encountered at a depth of 60 feet, 205-250 feet and 300-316 feet. The bottom of the lower most sandstone has a datum elevation of 119 feet above mean sea level. Well record of the R. Wade #1 is included in Appendix A. In the IMCO injection well, two sandstone zones with low conductivity, high resistivity are encountered at depths of 96-116 and 230-260 feet.

Figure D-1 is a map of fresh saline water interface of Butler County and surrounding counties, taken from H. T. Hopkins (1966). According to this map, the fresh saline water interface in the vicinity of the IMCO injection well is at datum elevation of 200-250 feet mean sea level.

The surface casing (9 5/8") is set at a 471 foot depth, about 271 feet below the fresh saline water interface and about 211 feet below the water-bearing sandstone unit of Pennsylvanian.

Figure D-2 shows the flood prone areas in the vicinity of the IMCO injection well.



SCALE 1"=8miles

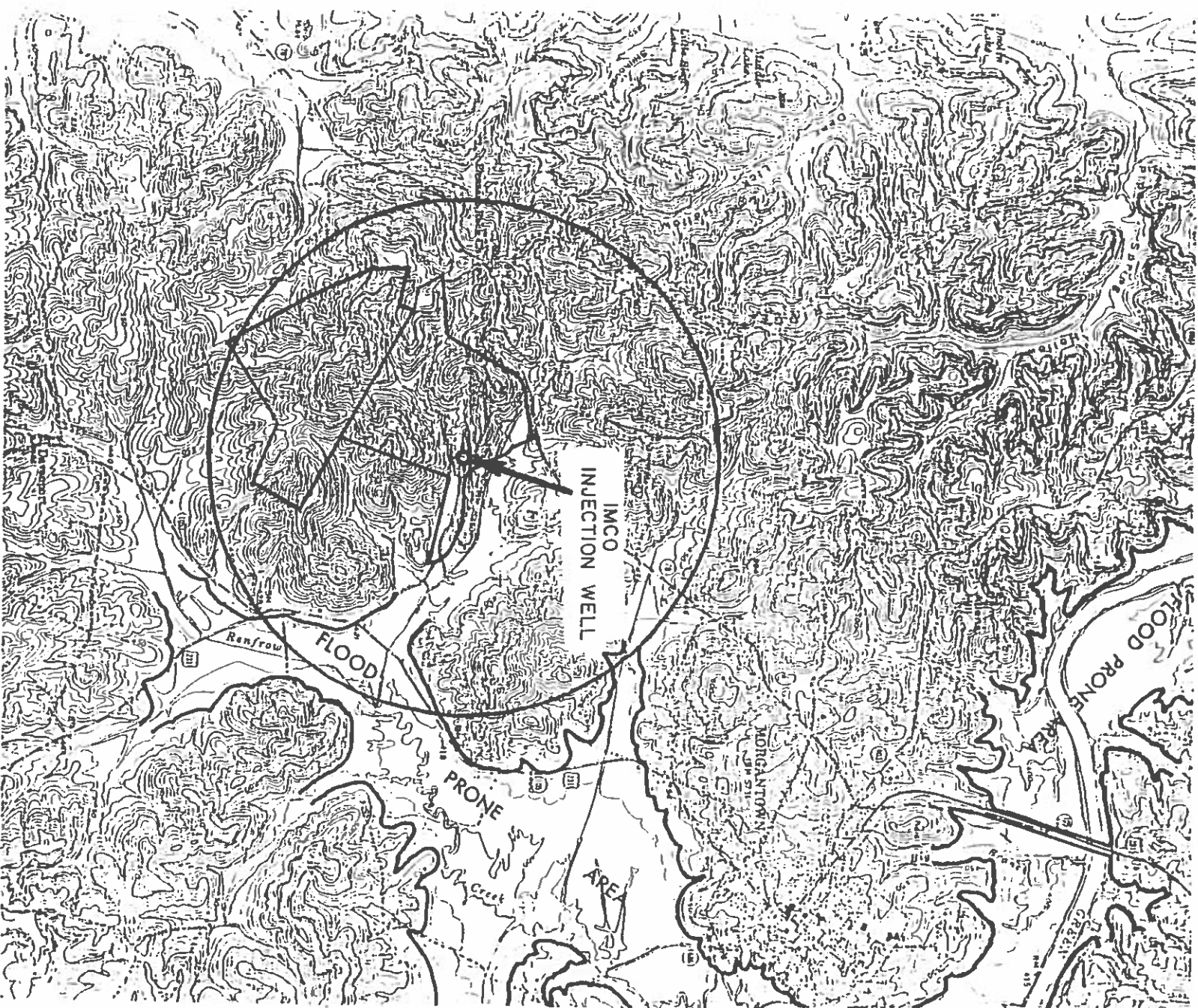
(FROM H.T. HOPKINS, 1966)



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FRESH SALINE WATER INTERFACE
CONTOUR MAP OF BUTLER COUNTY

FIGURE D-1



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MAP OF FLOOD PRONE AREAS IN THE VICINITY
OF IMCO SITE

SCALE: 1"=3000' DATE: FIGURE D-2

APPROVED BY: DRAWN BY: DRAWING NO.

100%

ATTACHMENT E
NOT APPLICABLE

ATTACHMENT F

MAPS AND CROSS-SECTIONS OF GEOLOGIC STRUCTURE OF AREA

Regional Geologic Setting:

The site of the IMCO injection well is located in the southeastern flank of the Moorman Syncline (Figure F-1). The Moorman Syncline is part of the Eastern Interior basin and it is bounded by two major fault zones, the Rough Creek fault zone to the north and the Pennyrite fault zone to the south. The Moorman Syncline trends east-west and deepens westward. The syncline is filled with over 10,000 feet of thick sediments of Paleozoic and possibly Precambrian.

The Rough Creek fault zone strikes east-west for over 175 miles in western Kentucky and extends into southern Illinois. The fault zone is about 15.5 miles wide. The fault zone consists of both high angle normal faults and reverse faults. The highest cumulative displacement (throw) across the fault zone is about 2,000-2,500 feet, down to the south.

The Pennyrite fault zone also extends east-west, and it terminates just east of Butler County. The Pennyrite fault zone is less pronounced than the Rough Creek fault zone. The Pennyrite fault zone consists of vertical to high-angle normal faults with down-to-the-north displacement. The cumulative displacement across the fault zone is about 500 feet, but it may increase to 1,000 feet in extreme western Kentucky.

Stratigraphy of the Site:

The consolidated surface strata at the site are of the Pennsylvanian Tradewater Formation. The section contains coal beds which were strip-mined at the site.

The stratigraphic column of the site was prepared by using data from the IMCO well, the wells drilled in the vicinity of the IMCO injection well and from the deep wells in the region as well as information from Gildersleeve, 1972, Schwalb, 1975 and Townsend and Cordivola, 1982. Figure F-2 shows the stratigraphic column of the site.

The Pennsylvanian section (Tradewater and Caseyville Formations) is composed of shale, siltstone and sandstone with coal seams and occasional thin limestone beds. The coal seams range from 0-48 inches in thickness. The coal previously exposed at the surface in the area of review have been mined by strip-mining. The total thickness of the Pennsylvanian section in the area of review is about 525 feet and 446 feet in the IMCO well. An erosional unconformity separates the Pennsylvanian strata from underlying Mississippian rocks.

Generalized Structure Map of Kentucky

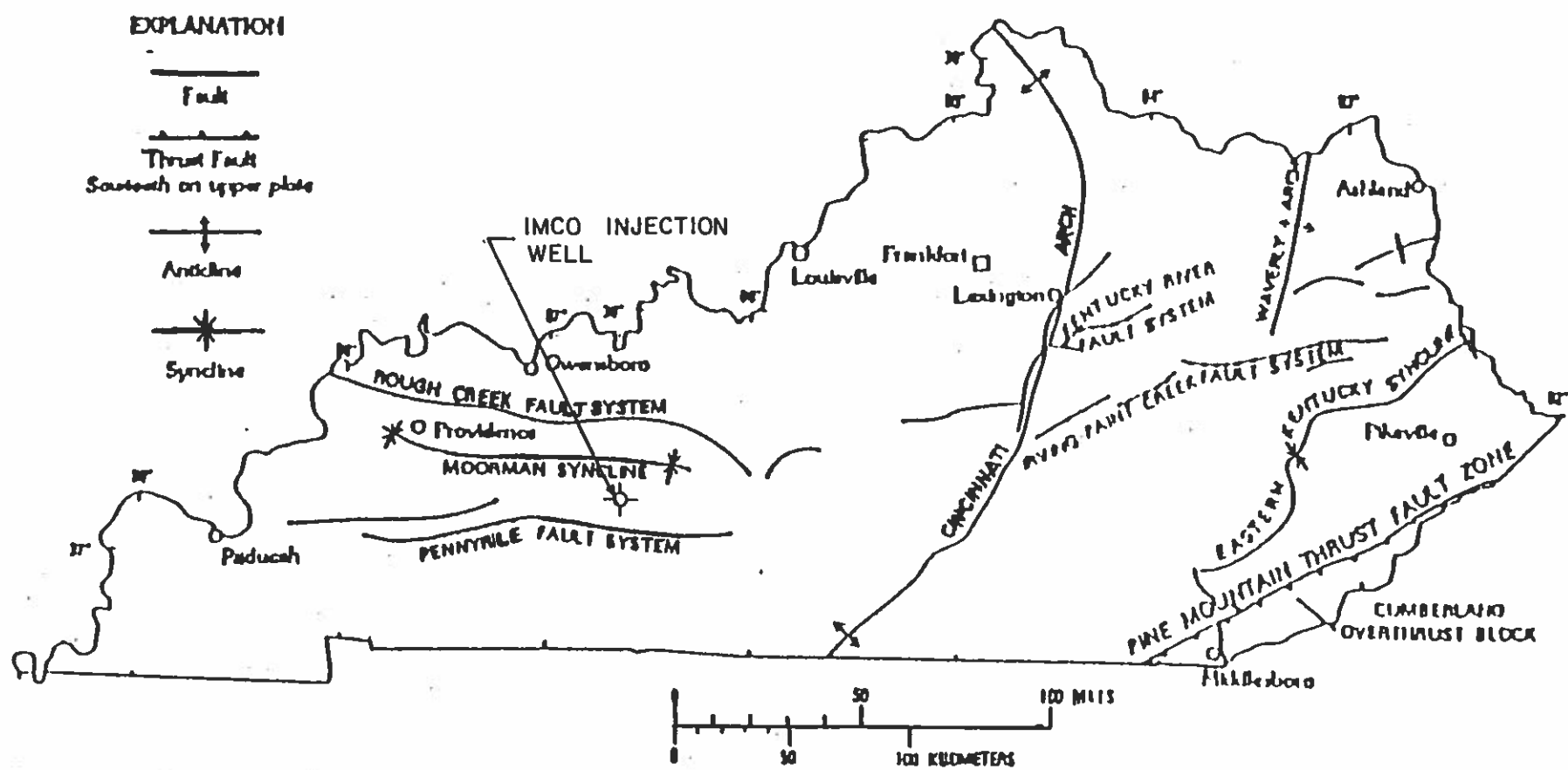


FIGURE F-1



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The Mississippian rocks are exposed about four miles south of the IMCO site, along the Pennyrite fault zone. The upper Mississippian section (Chester Series) is composed of alternating limestone, shale and sandstone. The thickness of the Chester Series is about 925 feet and only 764 feet in the IMCO well. The units of the Chester Series have produced most of the gas and oil in Butler County.

The lower Mississippian section (Kinderhook-Osage-Meramec Series) is mainly limestone with thin shale streaks, with the exception of the lower most two formations, Fort Payne and New Providence. The Fort Payne Formation consists of limestone in the upper two-thirds and mainly shale with limestone interbeds in the lower one-third, but in the IMCO well, the lower part is shaley limestone. The total thickness of Kinderhook-Osage-Meramec Series is about 925 feet in the area, and 1123 feet thick in the IMCO well. The Kinderhook Series conformably overlies the Upper Devonian New Albany (Chattanooga) Shale.

The New Albany (Chattanooga) Shale consists of dark brown to black, carbonaceous and pyritic shale. The shale contains spores and amber and is silty in some zones. The New Albany Shale widely extends in the subsurface and it is 162 feet thick at the site. The thickness increases westward. The New Albany Shale unconformably overlies the older Devonian rocks. The New Albany Shale together with the overlying shaley Fort Payne sections form a thick (300 feet) confining layer in the IMCO injection well.

The Lower-Middle Devonian section is mainly limestone with a thickness of 548 feet. The limestone is generally light colored and it is glauconitic, sandy, cherty or dolomitic in some zones.

The Silurian section is mainly carbonate with shale units in the upper part. The carbonates are usually light colored limestone and dolomite. The thickness of the Silurian section is 487 feet. The Silurian rocks unconformably overlie the Ordovician Leipers Formation.

The Upper Ordovician Leipers Formation varies in lithology in the region. In the IMCO injection well, it consists of gray, dark gray, calcareous shale, dolomitic limestone, limestone and siltstone. The siltstone is penetrated at the base of the Leipers Formation and in a well located about nine miles northwest of the IMCO site. The Leipers is 270 feet thick.

Below the Leipers Formation, the Ordovician section (Kimmurick, Platin, Pectonica and Joachim Formations) is generally limestone and dolomite. The Ordovician-Cambrian Knox Group unconformably underlies the Joachim Formation. The Knox Group is mainly dolomite. The IMCO injection well is completed in the Knox Group at a depth of 4700-6450 feet.

| SYSTEM | Formation | Lithology | Remarks |
|---------------|--------------------------------------|-----------|---------|
| PENNSYLVANIAN | | | |
| MISSISSIPPIAN | MERAMEC SERIES | | |
| | ST. GENIEVE | | |
| | ST. LOUIS | | |
| | FORT PAYNE | | |
| | NEW ALBANY | | |
| DEVONIAN | N. VERNON-JEFFERSONVILLE GRASSY KNOB | | |
| | BAILEY | | |
| SILURIAN | | | |
| ORDOVICIAN | LEIPERS | | |
| | KIMMSWICK | | |
| | PLATTIN-PECOTONICA | | |
| | JDACHIM | | |
| | KNOX DOLDRITE | | |

Confining Zone
(Seal)

Pad 4690
Injection Zone
4703 - 6457

Scale 1" = 80 ft.

STRATIGRAPHIC COLUMN

| | | |
|-------------|----------|-------------|
| SCALE: | DATE | FIGURE F-2 |
| APPROVED BY | DRAWN BY | DRAWING NO. |

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Underlying the Knox Group, at least 2000 feet thick sedimentary section of Cambrian age is expected.

Local Structure of the Area of Review and Its Surroundings:

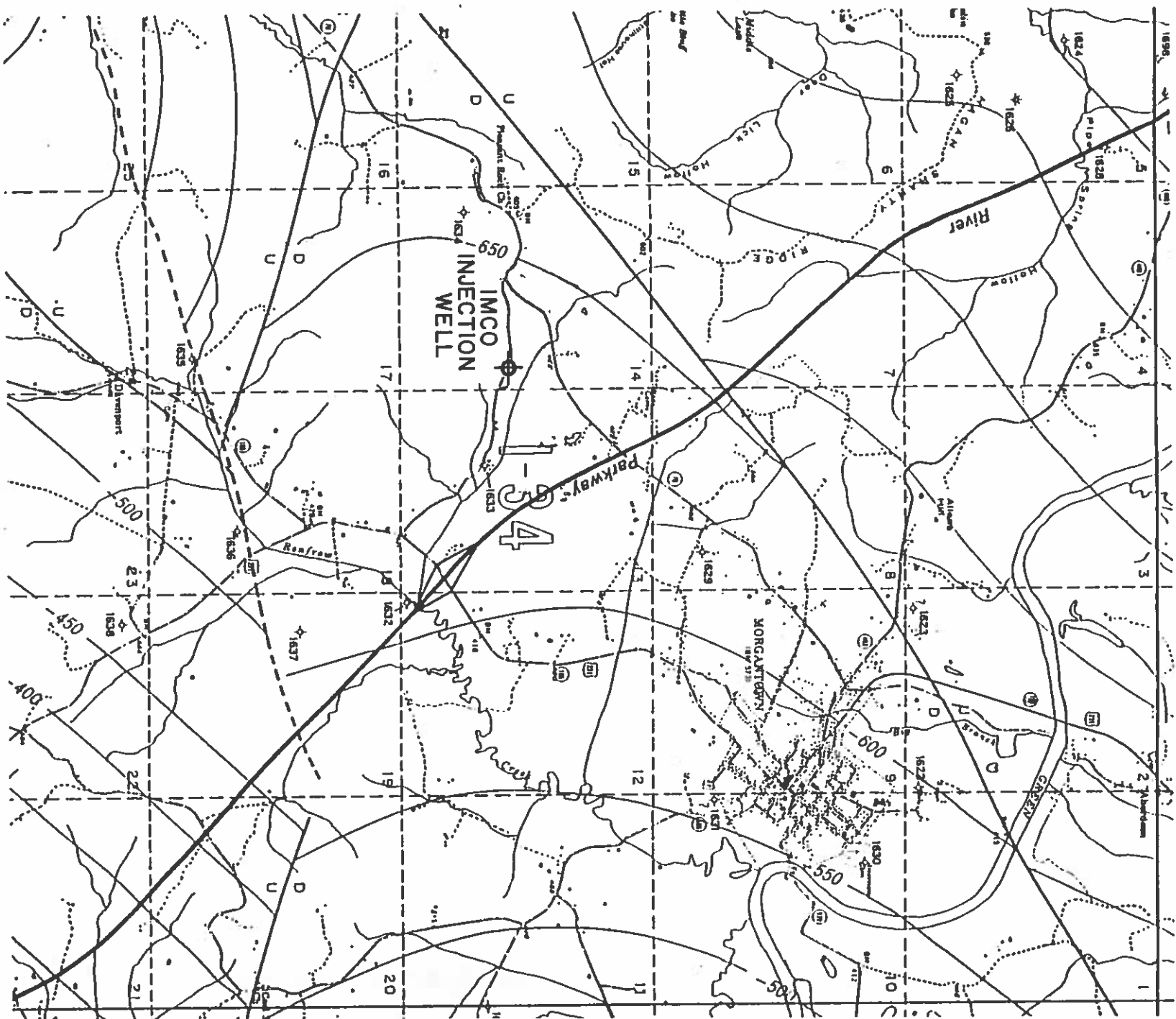
The bedrock at the site is horizontal or dips gently to the north. Faulting at the surface is observed about 3.5-4 miles south of the site. However, a fault inferred from subsurface information is located about 1.5 miles south of the site.

Figure F-3 shows structure on the base of the Mississippian Beech Creek Formation. The location of the IMCO injection well is on a faulted and westward-dipping nose structure.

Figure F-4 is an isopach and structure map of the New Albany Shale. The IMCO injection well is located on the southeastern flank of the Moorman syncline. Thus, the shallow nose structure does not extend down to deeper sections.

Figure F-5 shows a regional north-south geologic cross-section of Butler County. The cross-section is about 3-4 miles west of the IMCO site.

Figures F-6 and 7 are cross-sections showing the local structure at the IMCO site. The locations of the cross-sections are shown on Figure F-8. All the cross-sections show clearly that the strata dip gently northward and westward toward the Moorman Syncline axis. There is no structural complexity in the vicinity of the IMCO injection well.



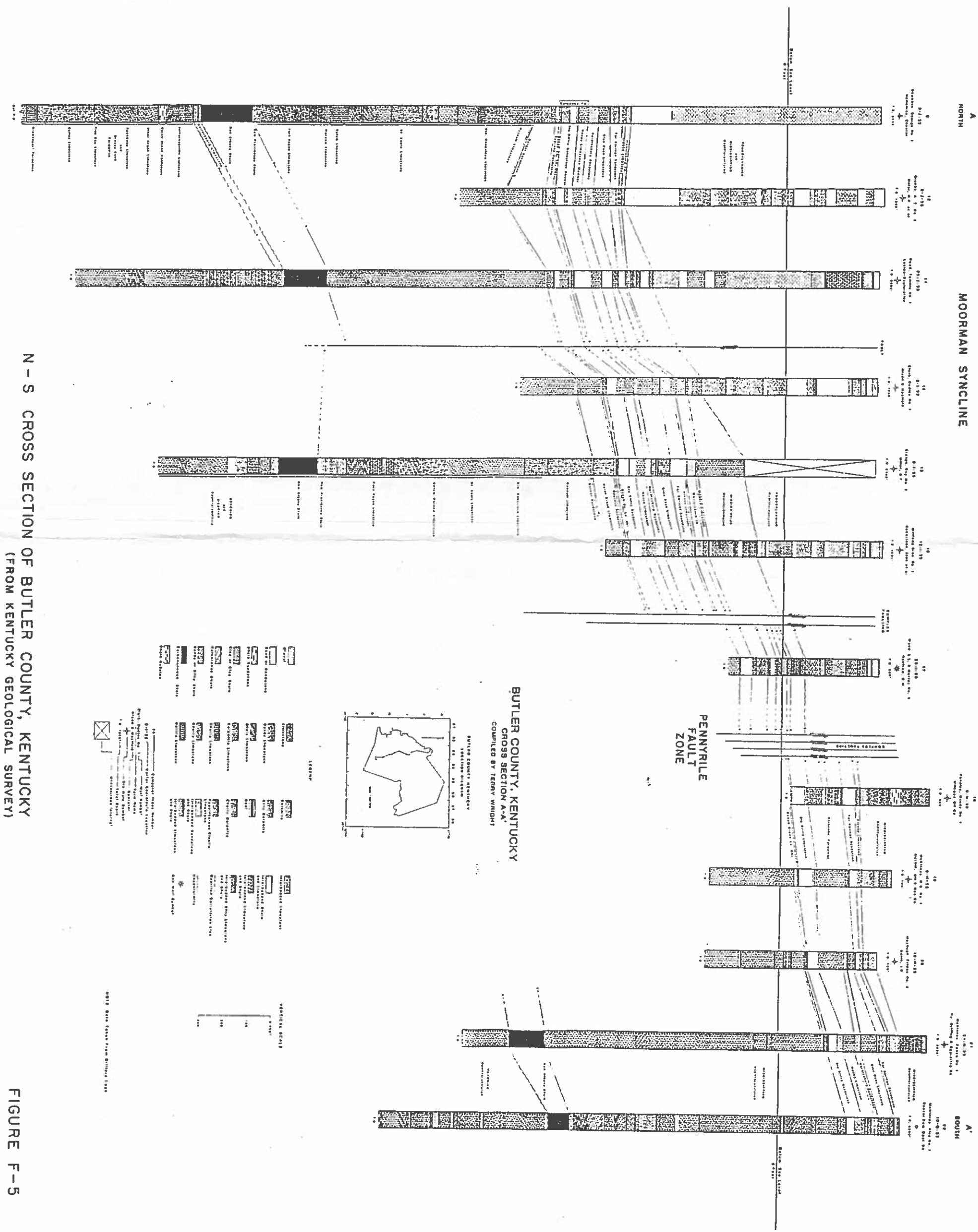
(FROM SCHWALB, 1975)

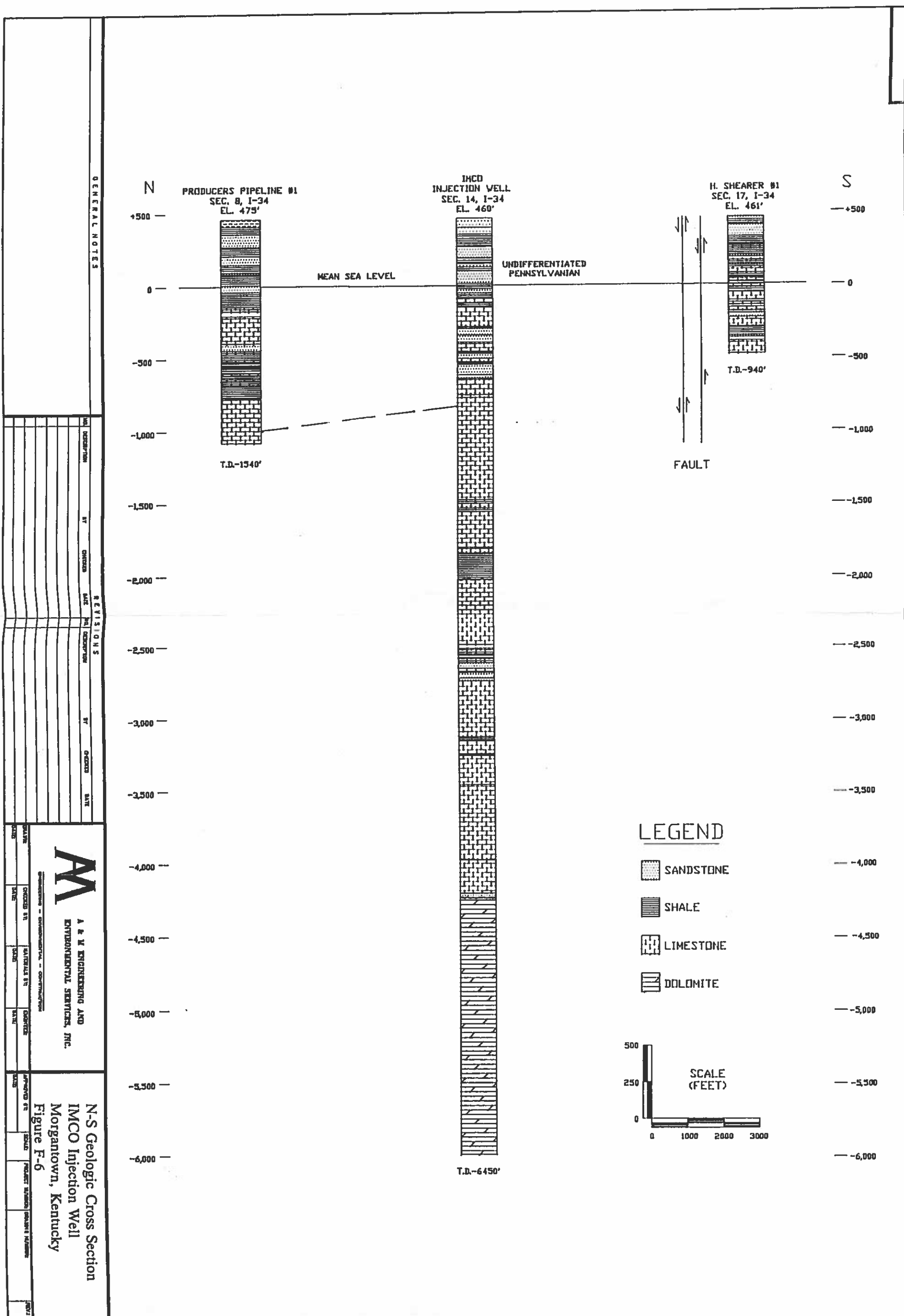
STRUCTURE CONTOUR MAP ON BASE OF
BEECH CREEK FORMATION (MISSISSIPPIAN)

SCALE: 1"=3450' DATE FIGURE F-3

APPROVED BY DRAWN BY DRAWING NO.

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GENERAL NOTES

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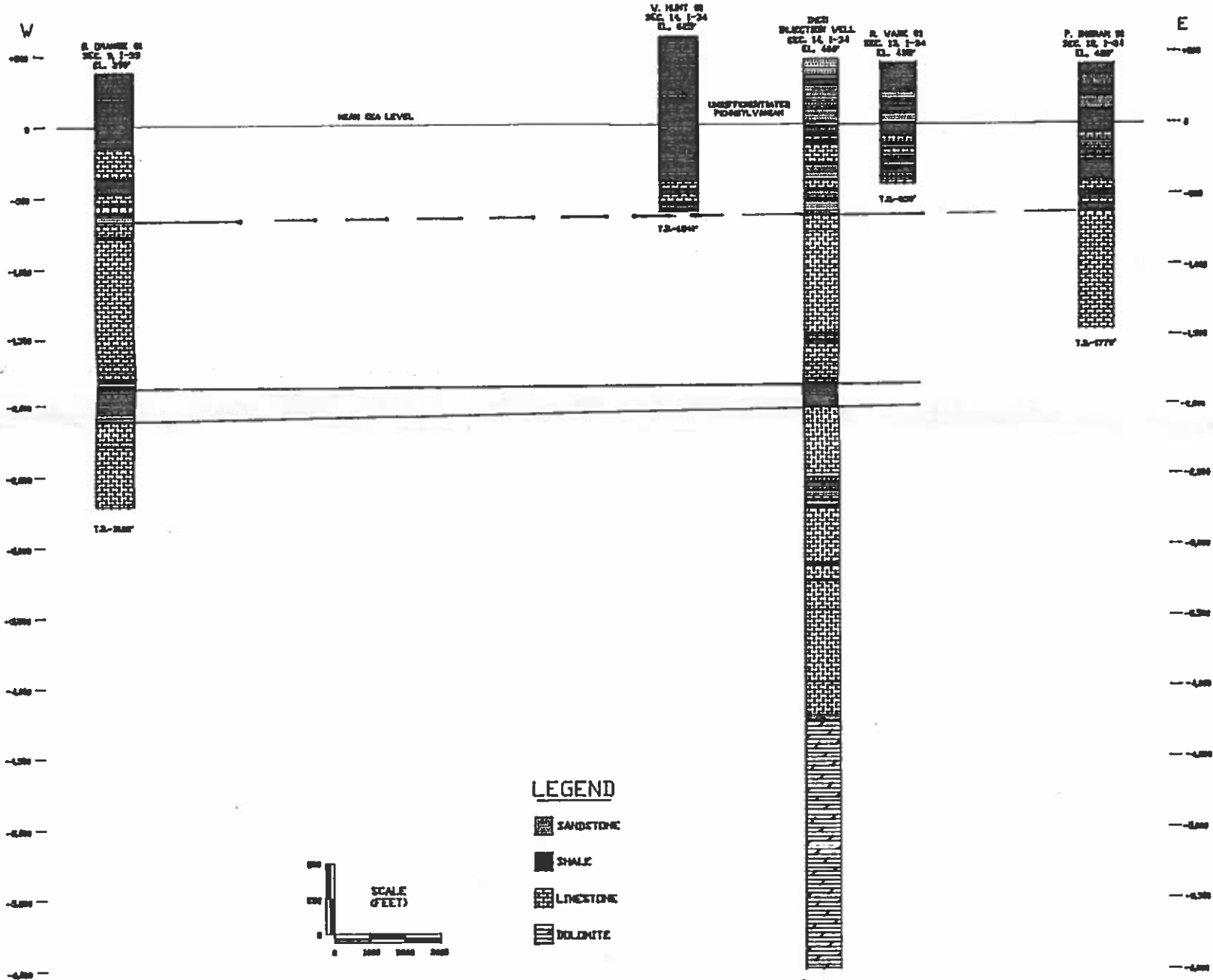
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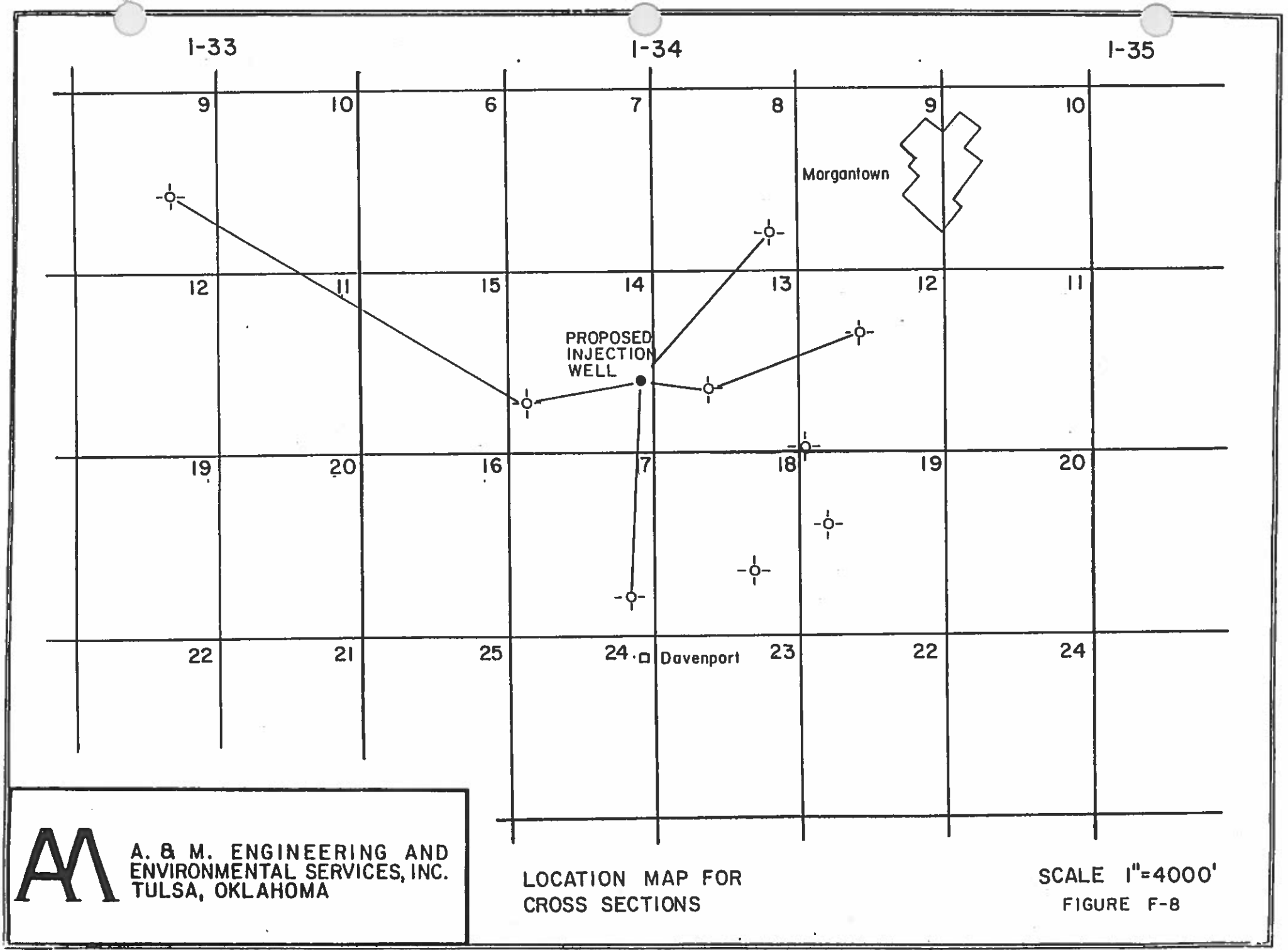


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W-E Geologic Cross Section
IMCO Injection Well
Morgantown, Kentucky
Figure F-7

| DATE | CHECKED BY | DATE | DATE | DATE | DATE | DATE | DATE | DATE | DATE |
|------|------------|------|------|------|------|------|------|------|------|
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ATTACHMENT G
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ATTACHMENT H OPERATING DATA

Volume and Flow Rate of Injection Fluid:

The water to be disposed in the IMCO injection well will be runoff water from the plant site and salt-water leachate from the non-hazardous solid waste landfill.

IMCO's property in Morgantown, Kentucky is about 548 acres, but the facilities including the landfill which may produce chloride contamination is only 35 acres. The average yearly precipitation in the area is about 3.3 feet. For purposes of calculation of maximum value, a runoff factor of 1 is used.

Thus, total yearly amount of runoff water from the 35 acres will be: $Q = CAP$

$$Q = 1 \times 35 \times 3.3 = 115.5 \text{ acre feet}$$

Converting acre feet to gallons:

$$115.5 \times 325,836 = 37,634,058 \text{ gallons/year}$$

Considering 80% efficient injection time throughout the year, it will give:

$$365 \times 0.8 = 292 \text{ days}$$

or

$$292 \times 1440 = 420,480 \text{ minutes of injection time}$$

Then the needed average injection flow rate to handle the non-hazardous runoff water and leachate will be:

$$37,634,058 : 420,480 = 89.5 \text{ gallons/minute}$$

This value considers zero annual evaporation of water. However, taking into consideration the wet years (above average precipitation), the maximum injection flow rate would be 120 gallons per minute. The injection rate of 120 gallons per minute would handle a yearly precipitation of 4.4 feet.

In summary:

$$\text{Average flow rate} = 90 \text{ gal/min} = 129,600 \text{ gal/day} = 3,086 \text{ bbl/day}$$

$$\text{Maximum flow rate} = 120 \text{ gal/min} = 172,800 \text{ gal/day} = 4,114 \text{ bbl/day}$$

5000 bbl/day

Injection Pressure:

IMCO Recycling Inc. conducted an acid job on the injection zone (Knox dolomite) during construction of the injection well. During the acid job, the acid injection pressures were about 3000 psi at wellhead. However, there was no fracturing in the formation. After this acid job, an injection test was conducted. The results of both acid job and injection test were submitted

to U.S. EPA Region IV on January 23, 1992 to determine the maximum allowable injection pressure and to modify the original permit.

U.S. EPA Region IV responded on February 5, 1992 allowing IMCO Recycling Inc. to operate the IMCO injection well with 2,700 psi wellhead pressure, based on the submitted data.

Average Injection Pressure:

The average injection pressure could be determined by using the formula of pressure rise in the injection zone. The same formula also gives approximate lifetime of the well. The formula is:

$$\Delta P = \frac{162.6 \times Q \times u}{K \times b} \times \left(\log \frac{K \times r}{\Phi \times \mu \times C \times r^2} \right)$$

where

- Q = flow rate, in bbl/d (90 gal/min = 3085.7 bbl/d)
- u = viscosity of fluid, 0.8 centipoise
- K = average permeability of injection zone, 8 millidarcies
- b = effective thickness of injection zone, 850 feet
- C = reservoir compressibility, 7.5 x 10⁻⁴ psi
- r = well radius of injection zone, 0.26 feet
- ø = average porosity of injection zone, 8% = 0.08
- t = time of injection in hours

Solving the formula for the above values, the following results are obtained:

| Time (t), hours | Cumulative pressure rise in injection zone (ΔP) |
|--------------------|--|
| 4,3803 (0.5 year) | 519.43 psi |
| 8,760 (1 year) | 537.14 psi |
| 43,800 (5 years) | 578.64 psi |
| 87,600 (10 years) | 596.17 psi |
| 175,200 (20 years) | 613.88 psi |
| 350,400 (40 years) | 631.58 psi |

The above calculation results indicate that the average injection pressure will rise about 600 psi and the tested injection pressure for 90 gpm was about 1200 psi. That will put the injection pressure at 1800 psi after 40 years' injection. This injection pressure is below the allowed 2700 psi injection pressure. However, during the eight years of operation, the pressure rise is much lower, due to at least much lower injection rate.

Annulus Fluid:

The annulus is filled with water containing corrosion inhibitor (Halliburton Anhib, see Exhibit H-1). The annulus fluid is pressurized to over 10 psi but less than 50 psi and monitored continuously. The annulus monitoring system is shown on Figure H-1.

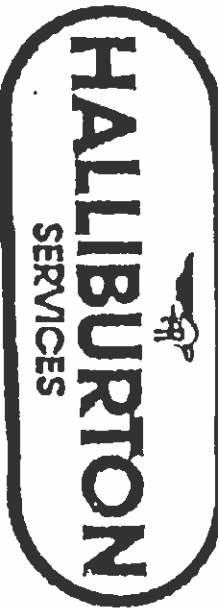
Injection Fluids:

The only fluids to be injected into the IMCO injection well are the chloride contaminated runoff water from the plant site and leachate from the solid waste landfill which are collected in adjacent ponds.

Chemical analysis reports of the solid waste (baghouse dust and salt cake) and leachate are included in Appendix B. The solid waste has high chloride and sodium concentrations. Besides these two non-hazardous contaminants, there are no other potential contaminants. Leachate analysis shows presence of same parameters (sodium and chloride).

EXHIBIT H-1

**ANNULUS FLUID CORROSION INHIBITOR
DATA**



ANHIB
Packer Fluid Corrosion Inhibitor

Halliburton Services ANHIB corrosion inhibitor is designed for use in aqueous fluids for placement in the annular space between tubing and casing or behind casing. As a multi-component system, ANHIB inhibitor can be used in place of high pH chromates used with bactericide. It is effective against oxygen, hydrogen sulfide and carbon dioxide corrosion.

Chemical Properties

Oxygen Scavenger
Requires a minimum concentration of 500 ppm (1/2 gal/1000 gal) to completely remove all oxygen from air saturated water. It is somewhat slower to pick up oxygen than most scavengers and is therefore less prone to loss while mixing, however careful mixing procedures should be followed.

Bactericide
Excellent bactericide for sulfate reducing bacteria at 40 ppm, however, for quick kill 500 ppm is recommended.

Corrosion Inhibition
Reduces oxygen corrosion by removing the oxygen. Minimizes corrosion by CO₂ and H₂S. (See Tables I and II)

Surface Tension
Reduces surface tension of sea water containing 1,000 ppm ANHIB inhibitor to 40.5 dynes/cm.

Compatibility
ANHIB is compatible with most Halliburton crosslinked gels which may be used as light weight annular, packer or completion fluids as well as Halliburton's Hydradraw fluid.

Stability
ANHIB is stable up to at least 300°F in brine solutions. (See Table III)

Benefits

- No pH adjustment required
- Reduced effect with hydrogen sulfide contamination
- Compatible with most brine or salt solutions
- Slow oxygen pickup
- Compatible with gels and crosslinked gels

Mixing Procedure

ANHIB corrosion inhibitor is readily soluble in most brines and easily soluble in a 2 percent KCl solution. This will help reduce mixing problems; however, it is an effective oxygen scavenger and will pick up oxygen from the air. It should be added with a minimum of agitation and preferably introduced below fluid level to minimize contact with air. It can be metered into the fluid as it is being pumped into the well.

Concentrations

ANHIB inhibitor can be used at a concentration as low as 500 ppm, (1/2 gal/1,000 gal); however, the standard recommendation is 5 gallons per 100 bbls, (1,190 ppm). At temperatures above 200°F the use concentration should be 10 gal per 100 bbls, (2,380 ppm). (ANHIB contains a red dye and can be seen in tap water at a concentration of 200 ppm).

Special Application

Gelled fluids are sometimes placed behind the intermediate string of pipe rather than cement to allow pipe recovery at some later date. The gel will remain behind the long string for as long as the well is produced and should be properly inhibited to protect the pipe from corrosion. Most corrosion inhibitors are not compatible with the crosslinked gels recommended for this application. ANHIB was specifically designed to be compatible with these crosslinked gels used as annular fluids behind casing.

ANHIB inhibitor is a red colored liquid with the following physical properties:

| | |
|------------------------------------|-------------------|
| Flash Point | 81°F TDC 67°F TCC |
| Pour Point | -20°F |
| Specific Gravity @60°F | 1.07 |
| Density @60°F | 9.9 lbs/gal |
| Odor | Pungent, ethanol |
| pH 10% solution in distilled water | 8.4 |
| Viscosity | 64 cps @60°F |

Table I
CO₂ Corrosion Tests

Type: Pressure bottle
Fluid: Tap Water*
Temperature: 72°F
Acid Gas: CO₂ @ 15 psig
Time: 7 days
Coupon: AISI 1020 carbon steel

| ANHIB Concentration ppm | Corrosion Rate MPY | Percent Protection |
|-------------------------|--------------------|--------------------|
| 0 (blank) | 11.3 | 0 |
| 5 | 0.8 | 93 |

*Contains a trace of oxygen when saturated with CO₂

Table II

Dynamic Corrosion Tests

Type: Wheel Test
Corrosive Fluid: 5% NaCl saturated with H₂S
Time: 1 day
Temperature: 100°F

| ANHIB Concentration | Percent Protection |
|----------------------------|--------------------|
| 20 ppm (1/50 gal/1000 gal) | 93 |
| 10 ppm (1/20 gal/1000 gal) | 93 |

Table III

High Temperature Corrosion Test

Type: Pressure bottle
Corroduct: Oxygen saturated brine*
pH: 9 to 9.5
Temperature: 300°F
Time: 5 days

| ANHIB Concentration | Percent Protection |
|----------------------------|--------------------|
| 2000 ppm (2 gal/1000 gal) | 72 |
| 5000 ppm (10 gal/1000 gal) | 76 |

*Brine contains 2% KCl adjusted to 10.2 lbs/gal with CaCl₂. It was air saturated at room temperature then heated in a closed system.

Manufacturer warrants only that in the process, supplies and materials furnished herein are of the quality and the fitness for service intended and that they are free of defects at the time of sale. There are no warranties, express or implied, of MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, or otherwise, which extend beyond those stated in the immediately preceding sentence. Manufacturer hereby disclaims any liability or remedy in any case of action, whether in contract.

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Litho U.S.A.

HALE BROS. CO.

3XH

TABLE 17

Effect of H₂S on Corrosion Inhibition

| | | | | | |
|------------------|-------------|---|-----------------------------|------------------------------|-----------------------------|
| Test Temperature | | 200° F (93° C) | | | |
| Test Time | | 6 Hours | | | |
| Metal Type | | N-80 | | | |
| Pressure | | Atmospheric | | | |
| Corrosant | | 15% HCl Saturated with H ₂ S | | | |
| | | Corrosion Rate | | | |
| % Inhibitor | % Acid Add. | HA1-50 lb/ft ³ | HA1-75 kg/m ³ | HA1-55 lb/ft ³ | HA1-55 kg/m ³ |
| 0.15* | — | 0.011 | 0.054 | — | 0.006 |
| 0.15* | 0.4%SCA-130 | 0.007 | 0.034 | — | 0.003 |
| 0.3 | — | 0.070 | 0.342 | 0.052 | 0.254 |
| 0.3 | 0.4%SCA-130 | 0.025 | 0.1221 | 0.011 | 0.054 |
| 0.5 | — | 0.038 | 0.185 | 0.011 | 0.054 |
| 0.5 | 0.4%SCA-130 | 0.011 | 0.054 | 0.008 | 0.039 |

*Tests Run at 150° F (65° C) on P105 Coupon.

NOTE: SCA-130 is not compatible with Super Acidfrac and should not be used in that system. HA1-50 and HA1-55 are also incompatible with Super Acidfrac.

ANHIB
PACKER FLUID CORROSION INHIBITOR

Introduction

ANHIB is a corrosion inhibitor which is designed for use in aqueous fluids for placement in the annular space between tubing and casing or behind casing.

ANHIB is a multi component system in a single drum which can be used in place of sodium chromate. It is effective against oxygen, hydrogen sulfide and carbon dioxide corrosion. No pH adjustment is required with this inhibitor; therefore, it should be easier to use than sodium chromate. In addition, ANHIB is an organic corrosion inhibitor which will not be as adversely affected by hydrogen sulfide as the chromate system if contamination occurs. This material is also an effective bactericide for sulfate reducing bacteria when used in the recommended concentration range. The normal recommended dosage for this inhibitor is 5 gallons per 100-

bbls (120 liters per 100m³) (approximately 1200 ppm) or 1 gallon per 1000 gallon (1 liter per 1000 l).

Materials Used in Process

ANHIB (Part No. 70.153+1) is red colored liquid with following physical properties:

| | |
|---|---|
| Flash Point..... | 81° F (27° C) T.O.C./67° F (19° C) T.C.C. |
| Pour Point..... | -20° F (-29° C) |
| Specific Gravity @ 60° F (15.6° C)..... | 1.07 |
| Density @ 60° F (15.6° C)..... | 8.9 lb/gal (1.06 kg/l) |
| Color..... | Red |
| Odor..... | Pungent, alcoholic |
| pH 10% solution in distilled water..... | 8.4 |
| Viscosity..... | 64 cps @ 60° F (15.6° C) |
| Stability..... | Greater than 6 months |

but should be used as soon as possible.

NOTE: An open can will degrade eventually so it is recommended that you use all of the 5 gallon can. Carefully replace the bung in a 55 gallon drum. The bung should be tight to prevent additional air from entering the drum.

Mixing Procedure

ANHIB is readily soluble in most brines so should present no mixing problems; however, it is an effective oxygen scavenger and will pick up oxygen from the air. It should be added with a minimum of agitation. Do not use air agitation. Hoses should be introduced below fluid level to minimize beating in additional air. Waiting time before pumping should also be kept to a minimum.

You may want to meter the material into the packer fluid at the pump suction as a concentrate. The hydrazine pump should be satisfactory for this purpose.

Use Concentration

ANHIB can be used at a concentration as low as 500 ppm (¼ gal/1000 gallons) (¼ l /1000 l); however, the standard recommendation is 5 gallons in 100 bbls (120 liters in 100m³). At temperatures above about 220° F (93° C) the use concentration should be 10 gal/100 bbls (240 l/100m³).

ATTACHMENT I FORMATION TESTING PROGRAM

Lithology Log:

During drilling, drill cuttings were sampled at 10-foot intervals from the surface to total depth.

These samples were examined by a geologist. A lithologic description and strip log are enclosed in Appendix D. The collected samples are delivered to Kentucky Geological Survey.

Pressure:

During well construction, DST's (Drill Stem Tests) were conducted to determine formation pressure and pressure gradient in the well. The first DST was run at 4750-5250 feet depth with a pressure of 2089 psi and pressure gradient of 0.435 psi/ft. The second DST was at 5250-5872 feet depth with a pressure of 2341 psi and pressure gradient of 0.442 psi/ft. The third DST was at 5900-6450 feet with a pressure of 2650 psi and pressure gradient of 0.445 psi/ft. The data related to DST's are included in Appendix E.

Temperature:

A temperature log was run and it is included in Appendix D. The bottom hole (6450 feet) temperature is 112°F. The geothermal gradient is about 0.7 to 1.0 F°/100 feet.

Formation (Injection Zone) Fluid:

During Drill Stem Tests (DST's), formation fluid was recovered and was sampled. These fluid samples were analyzed for the required parameters. The analytical reports of these samples are included in Appendix E.

The formation fluid shows stratification, as depth increases the total dissolved solids increase from 61,260 ppm to 94,040 ppm and specific gravity from 1.036 to 1.06.

The formation fluid and injectate were mixed at room temperature and at formation temperature (112°F) and there were no reactions or precipitation observed.

Swabbing:

After logging and drilling cement plugs were completed at total depth, the drilling mud was

evacuated from the well and the well was cleaned with water. After cleaning, the well was swabbed. Black, sulphur formation fluid was recovered; the same as the fluid recovered during drill stem tests.

Swabbing was also conducted after perforating the formation to clean the well.

Injection Survey:

The first injection test was conducted on December 30-31, 1991, in the well after the first clean up to determine the hydraulic conductivity of the injection zone and its acceptability of the fluid. The results are shown in Appendix F. The well was accepting fluid at a rate of 10-14 gpm with 1000 psi wellhead pressure.

The second injection test was conducted on January 17, 1992 after perforating and acidizing the injection zone. The injection test was step-rate type and the results are included in Appendix F. The injection rates and pressures were 42 gpm with 330 psi; 58 gpm with 522 psi; 84 gpm with 890 psi; 105 gpm with 1254 psi; and 150 gpm with 1984 psi. The summary data of this test is shown on Table I-1 and Figure I-1.

Injection Zone Characteristics:

The injection zone is the Knox dolomite at depth of 4705-6450 feet. The average porosity is about 10 percent. The effective reservoir thickness is approximately 600-850 feet. The porosity types are intercrystalline, fracture and vugs.

The permeability was calculated in a range of 1.6 to 50 md from the drill stem tests. However, permeability calculation from the injection test data of January 17, 1992 (after acidizing) shows it to be 6-10 md.

Transmissivity values were calculated from drill stem tests to be 229.5 md feet/cp for 4750-5250 feet, 6764.16 md feet/cp for 5250-5872 feet and 10731.6 md feet/cp for 5900-6450 feet depth. Transmissivity was calculated to be 2634.12 md ft/cp from the injection test of January 17, 1992 for all injection zones (4700-6450 feet).

Attempted to obtain core samples by sidewall coring, but after three samples were obtained at depths of 3324, 3809 and 3833 feet, the tool malfunctioned and could not complete coring.

TABLE I-1
INJECTION RATES, PRESSURES AND INJECTIVITIES RECORDED
DURING THE JANUARY 17, 1992 INJECTION TEST
IMCO RECYCLING INC, MORGANTOWN, KENTUCKY

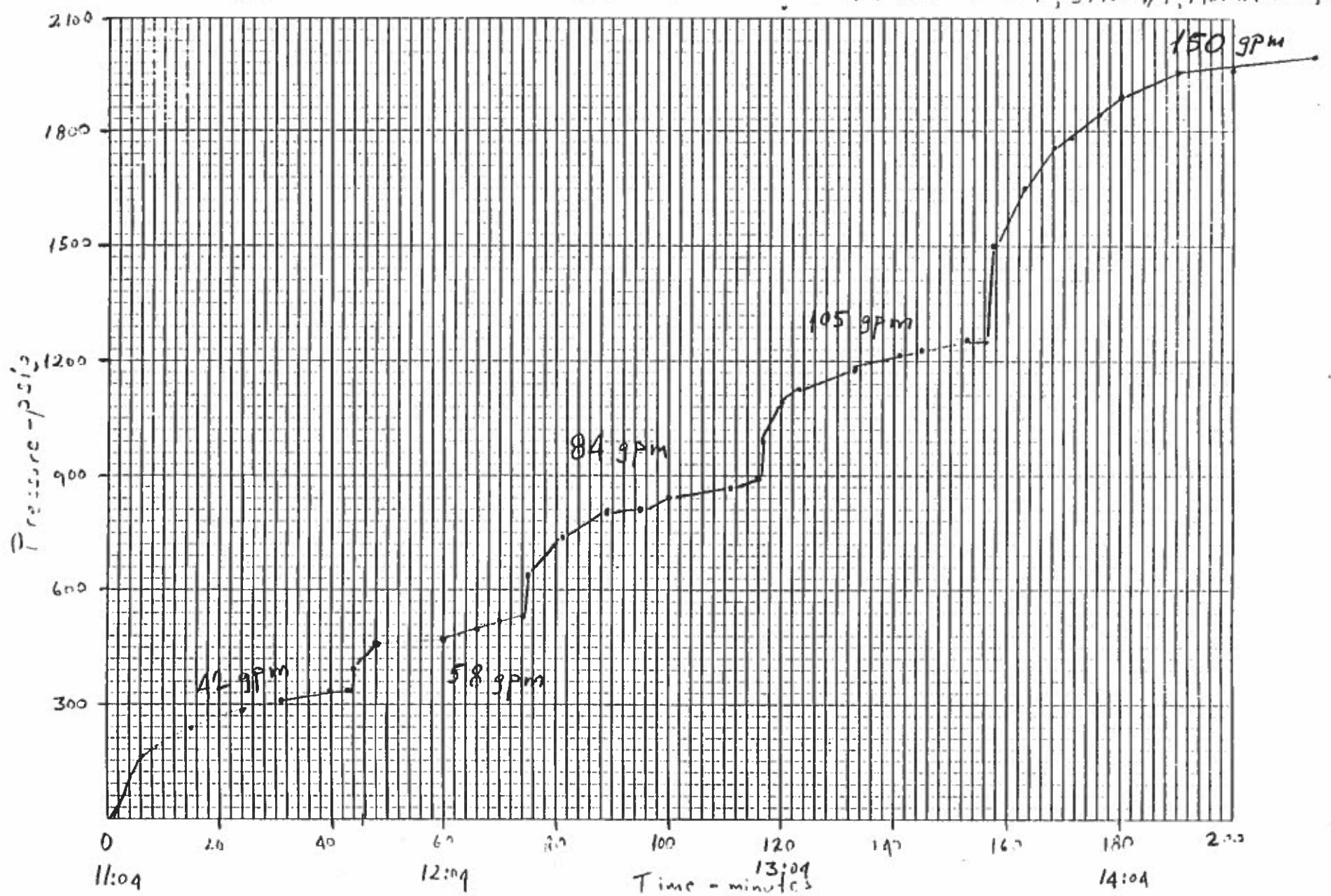
| TIME (Hour) | INJECTION RATE (gpm) | WELLHEAD INJECTION PRESSURE (psig) | INJECTIVITY (gpm/psi) | |
|----------------|-------------------------|---------------------------------------|--------------------------|---------------|
| 11:04 start | | | | |
| 11:35 | 42 | 304 | 0.138 | |
| 11:40 | 42 | 320 | 0.131 | |
| 11:45 | 42 | 331 | 0.126 | |
| 11:47 | 55 | 389 | | Rate increase |
| 11:57 | 55 | 440 | | |
| 12:00 | 59 | 458 | | |
| 12:05 | 59 | 466 | | |
| 12:10 | 59 | 504 | | |
| 12:15 | 59 | 515 | 0.114 | |
| 12:18 | 59 | 522 | 0.113 | |
| 12:19 | 84 | 632 | | Rate increase |
| 12:25 | 84 | 737 | | |
| 12:40 | 84 | 821 | | |
| 12:45 | 84 | 845 | | |
| 12:50 | 84 | 867 | | |
| 12:55 | 84 | 880 | 0.095 | |
| 12:59 | 84 | 888 | 0.094 | |
| 13:00 | 106 | 985 | | Rate increase |

| TIME (Hour) | INJECTION RATE (gpm) | WELLHEAD INJECTION PRESSURE (psig) | INJECTIVITY (gpm/psi) | |
|----------------|-------------------------|---------------------------------------|-----------------------------|---------------|
| 13:06 | 106 | 1124 | | |
| 13:10 | 106 | 1142 | | |
| 13:15 | 106 | 1153 | | |
| 13:20 | 106 | 1203 | | |
| 13:25 | 106 | 1227 | | |
| 13:30 | 106 | 1233 | 0.086 | |
| 13:35 | 106 | 1250 | 0.084 | |
| 13:40 | 106 | 1254 | 0.084 | |
| 13:40:1 | 147 | 1500 | | Rate increase |
| 13:45 | 147 | 1645 | | |
| 13:50 | 147 | 1735 | | |
| 13:55 | 147 | 1787 | | |
| 14:00 | 147 | 1839 | | |
| 14:07 | 147 | 1887 | | |
| 14:10 | 147 | 1900 | | |
| 14:15 | 147 | 1933 | | |
| 14:21 | 147 | 1938 | | |
| 14:25 | 147 | 1957 | | |
| 14:30 | 147 | 1969 | | |
| 14:35 | 147 | 1978 | 0.074 | |
| 14:40 | 147 | 1984 | 0.074 | |
| 14:41 | 0 | 1540 | Instant shut-in pressure | |

| TIME (Hour) | INJECTION RATE (gpm) | WELLHEAD INJECTION PRESSURE (psig) | INJECTIVITY (gpm/psi) | |
|----------------|-------------------------|---------------------------------------|---------------------------------|--|
| 14:45 | 0 | 1004 | 5 minutes shut- in pressure | |
| 14:50 | 0 | 760 | 10 minutes shut- in pressure | |

Figure I-1

PRESSURE-INJECTION RATE OF JANUARY 17, 1992 TEST, JACO #1, MORGANTOWN, KY.



ATTACHMENT J
STIMULATION PROGRAM

After the first injection test, it was recognized that the injection zone did not have the capacity needed. Thus the decision was made to perforate the zones with good potential and follow with an acid job.

The perforating job was conducted during January 5-10, 1992. The following zones were perforated with 100 gram shots, one per foot: 4894'-4904', 4996'-5024', 5148'-72', 5366'-70', 5398'-5406', 5464'-72', 5534'-52', 5570'-88', 5612'-32', 5658'-70', 5680'-90', 5712'-24', 5732'-38', 5806'-10', 5842'-66', 5910'-16', 5988'-94', 6026'-34', 6074'-84', 6128'-38', 6182'-88', 6230'-52', 6315'-30', 6358'-74', 6402'-04', 6420', 6432'-38'.

After perforating job was completed, the well was cleaned and swabbed. Then on January 15, 1992, the injection zone (4705-6450 feet depth) was acidized with 15,000 gallons 28 % hydrochloric acid in five stages. Salt was used as a diverter. Acid job records are included in Appendix F. The acid job resulted in drastic improvement of the injection zone, from 14 gpm with 1000 psig wellhead pressure to 84 gpm with 888 psig wellhead pressure.

K

ATTACHMENT K

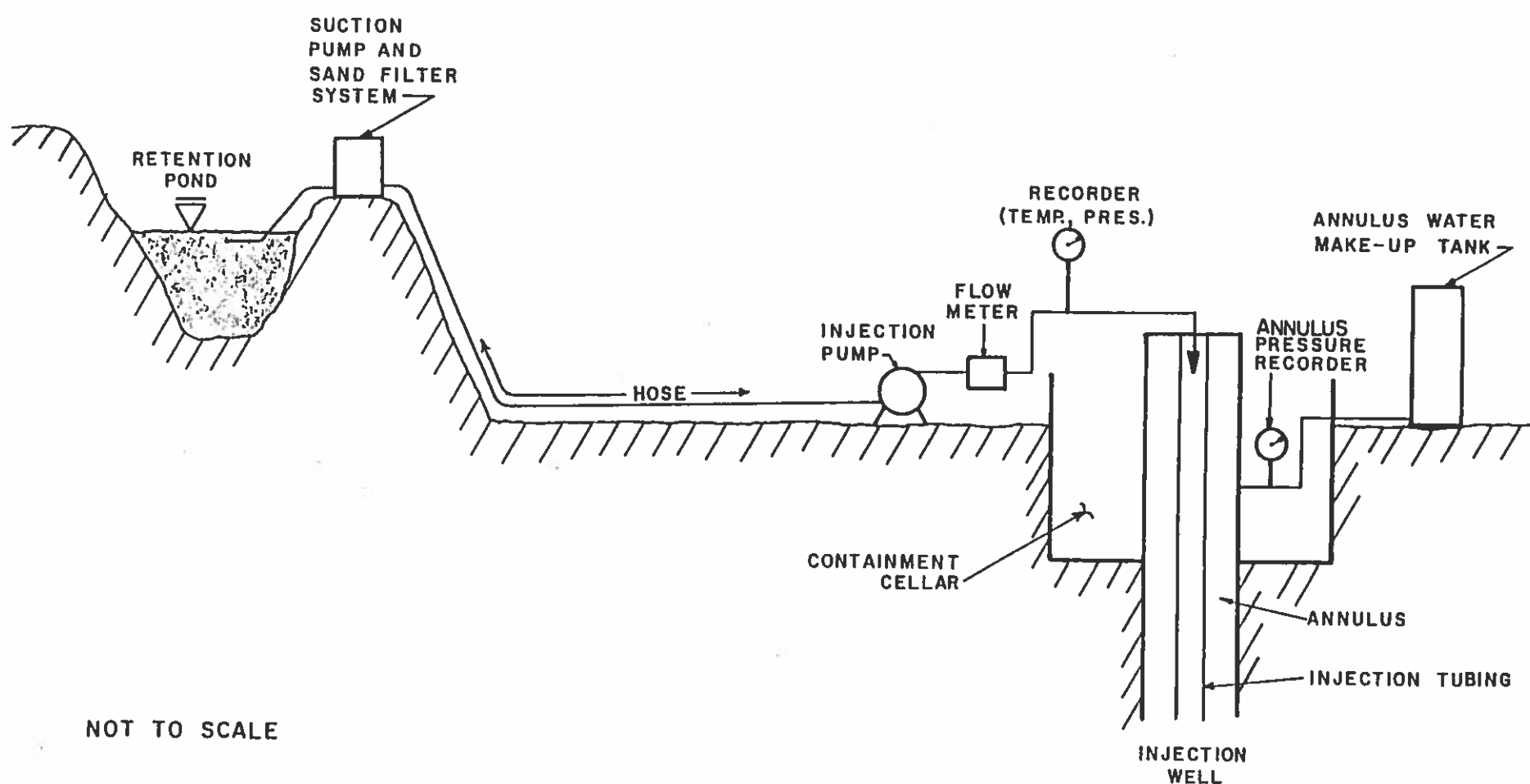
INJECTION PROCEDURES

The injection procedure includes suction of the fluid from the retention pond and pumping it into the injection well. Figure K-1 shows schematically the surface injection system.

The suction assembly consists of: 1) screen, to prevent suspended solids; 2) hoses; 3) check valve; 4) hoses; and 5) pump. The detailed drawing of this section is shown on Figure M-2.

The water sucked from the retention pond goes through pressurized sand filters to further eliminate suspended solids in the fluid. The fluid is transported by 3" plastic hose from the sand filters to the injection pump next to the injection well. The detail of the filter system is shown on Figure M-3.

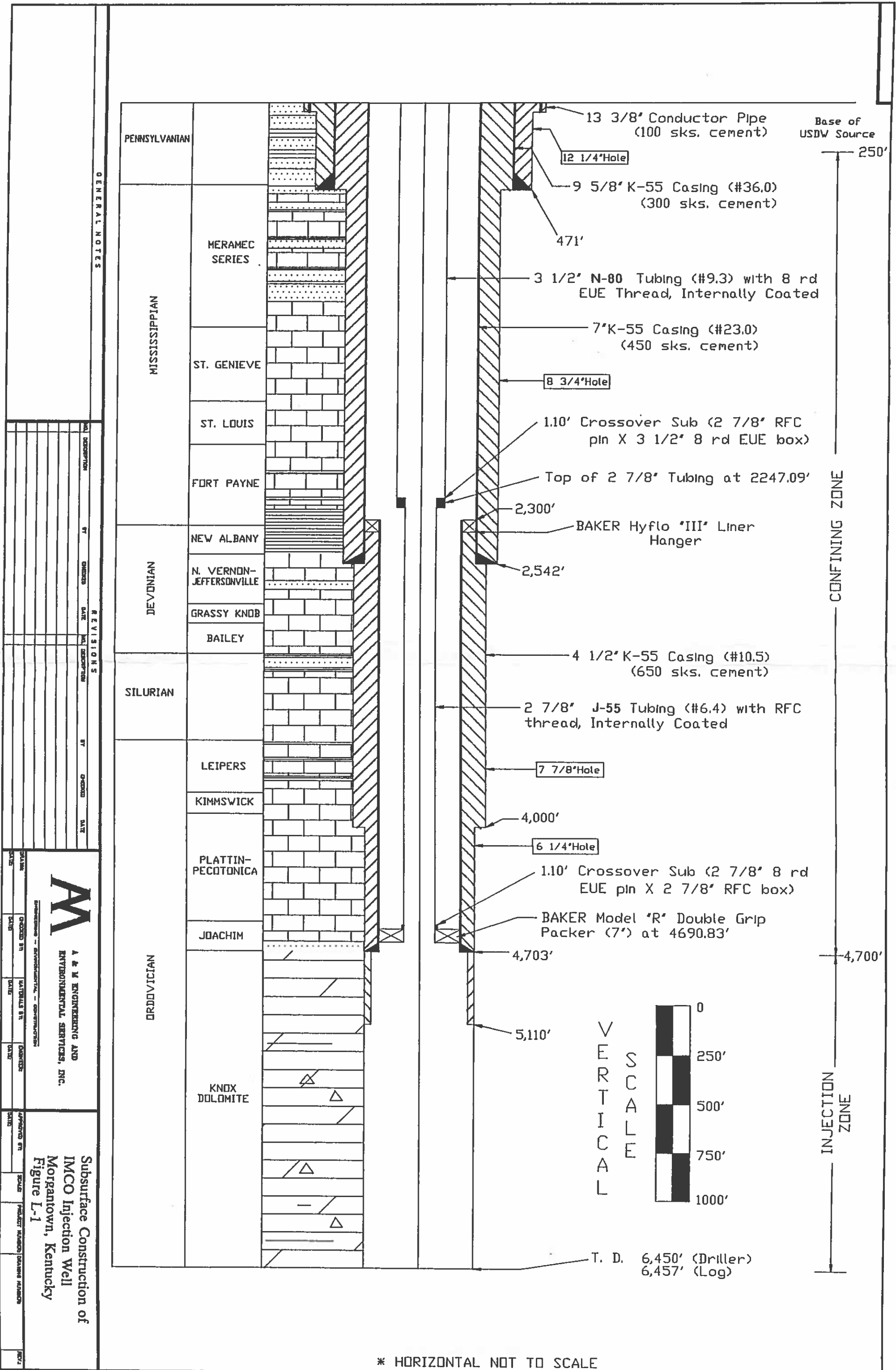
The injection pump is Wheatley Triplex Plunger pump (positive displacement pump). The pump has a capacity up to 120 gallons per minute.



A. & M. ENGINEERING AND
ENVIRONMENTAL SERVICES, INC.
TULSA, OKLAHOMA

SCHEMATIC SURFACE DESIGN DRAWING OF THE
IMCO INJECTION WELL

FIGURE NO. K-1



ATTACHMENT L
CONSTRUCTION PROCEDURES

The IMCO injection well was drilled during August-December 1991, to a depth of 6,450 feet by a rotary drilling rig. During drilling, water-base mud provided by M-1 Drilling Fluids Company was used.

Drilling commenced on August 11, 1991. First a 17 1/2" hole was drilled to 42 feet depth and set up 13 3/8" conductor pipe with 100 sacks of cement.

Drilling was continued with 12 1/4" diameter bit to 471 feet (driller depth). Logging (SP and resistivity) was conducted before setting 9 5/8" casing at depth of 471 feet.

The well was drilled with 8 3/4" diameter bit to 2526 (driller depth) feet depth and 7 7/8" bit to 4,000 feet depth. After logging, 7" K-55 long string casing was set in at 2542 feet depth. The Devonian-Silurian and part of the Ordovician carbonate sections were evaluated for injection and due to low potential and some problems with the fracturing program, the decision was made to drill deeper into the Knox Dolomite.

Drilling was resumed after new permits were obtained from the U.S. EPA and Kentucky Oil and Gas Division. The well was bottomed to 6450 (driller depth) feet into the Knox Dolomite. The size of the bit was 6 1/8".

The copies of the drilling records of the IMCO injection well are included in Appendix G and Figure L-1 shows the subsurface construction details of the IMCO injection well.

Casing and Tubing Program:

| | |
|-----------------|--|
| Conductor Pipe: | 13 3/8" conductor pipe was set at 42 feet depth with 100 sacks of cement. |
| Surface Casing: | 9 5/8" OD, K-55 seamless, 36.0 lb/ft STC (Short Threaded Couplings). Collapse Resistance: 2020 psi Internal Yield: 3520 psi Body Yield Strength: 564,000 lbs. Joint Strength: 423,000 lbs. |

475.70 feet of new 9 5/8" casing was set in the well with 450 sacks of cement. The lowest USDW is at a depth of 260 feet and the surface casing (9 5/8") is set about 200 feet lower.

Long String:

7" OD, K-55 seamless, 23 lb/ft, long threaded couplings.
Collapse Resistance: 3270 psi.
Internal Yield Pressure: 4360 psi.
Body Yield Strength: 366,000 lbs.
Joint (Coupling) Strength: 341,000 lbs.

7 lowest joints of 7" casing were sandblasted for better cement bonding. Long string (7") casing was set at 2542 feet depth with 450 sacks of cement. The cement was circulated through formation packer pack-off shoe.

The purchase ticket for 9 5/8" surface casing and 7" casing are shown as Exhibit L-1. These casings were electronically inspected before delivery to the site.

Liner String:

4 1/2", K-55 seamless, 10.5 lb/ft, short threaded couplings.
Collapse Resistance: 4010 psi
Internal Yield Pressure: 4790 psi
Body Yield Strength: 165,000 lbs.
Joint (Coupling) Strength: 146,000 lbs.

The 4 1/2" casing was hung with 7 foot long Baker Hyflo "III" Liner Hanger. Top of hanger is at 2300 feet depth. The 4 1/2" casing was set at 4703 feet depth with 650 sacks of cement. The cement was circulated through formation packer pack-off shoe.

The tally sheet of 4 1/2" casing is shown as Exhibit L-2. The 4 1/2" casing was inspected electronically before delivery to the site. Baker Hyflo "III" Liner Hanger information is presented as Exhibit L-3.

Tubing (Injection):

Two types of injection tubing form the injection tubing string: 1) 3 1/2" OD N-80 tubing inside the 7" casing; and 2) 2 7/8" OD J-55 tubing inside the 4 1/2" casing. Specifications of these two tubing types are given below.

3 1/2" OD N-80 Tubing:

Weight: 9.30 lb/ft
Inside diameter: 2992 inches

Drift diameter: 2867 inches
Thread type: 8 rd EUE upset
Collapse Resistance: 10,530 psi
Internal Yield Pressure: 10,160 psi
Joint Yield Strength: 207,220 lbs.
Coating: TK-70 of Tuboscope (plastic coating inside).

The 3 1/2" tubing tally is shown as Exhibit L-4. The 3 1/2" tubing is 2,247.09 feet and connected with 1.10 feet long crossover to the 2 7/8" tubing. The crossover sub is with 2 7/8" RFC pin and 3 1/2" 8rd EUE box.

2 7/8" OD J-55 Tubing:

Weight: 6.40 lb/ft
Inside diameter: 2441 inches
Drift diameter: 2347 inches
Thread Type: RFC (Reed Flush Coupling)
Collapse Resistance: 8100 psi
Internal Yield Pressure: 7700 psi
Joint Yield Strength: 49,450 lbs.
Coating: TK-77 of Tuboscope (plastic coating inside)
The tally is in Exhibit L-4.

Packer (Injection):

4 1/2" x 2 7/8" Baker Model "R" Double Grip Packer set at 4690.83 feet depth. The packer is connected to the 2 7/8" tubing by a crossover sub (2 7/8" 8rd EUE pinX 2 7/8" RFC box).

The packer is plastic coated and its technical information is presented in Exhibit L-5.

Cement Program:

Conductor Pipe - 13 3/8" conductor pipe is set at 42 feet depth and cemented with 100 sacks of Class A cement and 2 sacks of Calcium Chloride. The cement was circulated to the surface. The cement job ticket is included in Exhibit L-6.

Surface Casing - 9 5/8" K-55 casing is set from 471 feet depth to the surface and cemented with 300 sacks of Class A cement and 4 sacks of Calcium Chloride. Three

centralizers were used. The cement was circulated to the surface. The cement job ticket and report of the U.S. EPA representative are included in Exhibit L-6. Cement Bond Log for this casing was run and is included in Appendix D.

Long String - 7" K-55 casing is set from 2542 feet depth to the surface and cemented with 450 sacks of Class A cement, 2 % gypsum, 3 % potassium chloride and other additives. Three cement baskets and fifteen centralizers were used. The cement was circulated to the surface. The cement job report and report of the U.S. EPA representative are included in Exhibit L-6. Cement Bond Log for this casing was run and is included in Appendix D.

Liner (4 1/2" Casing) - 4 1/2" K-55 casing is set at a depth of 2300 - 4703 feet. The overlap in between 7" and 4 1/2" casings is 242 feet. The liner hanger is seven feet long, Baker Hyflo "III" type. Twenty-two centralizers were used. The liner was cemented with 650 sacks of Class A cement, 2 % gypsum, 3 % potassium chloride and with additional additives. The cement was circulated to the surface. The cement job report and report of U.S. EPA representative are included in Exhibit L-6. The Cement Bond Log is included in Appendix D.

Logging Program:

The following logs were run in the IMCO injection well during construction:

- 1) After drilling to 471 feet depth
 - a) SP - Induction Electric Log
- 2) After drilling to 4000 feet depth
 - a) Gamma Ray - Compensated Neutron -Litho Density
 - b) Gamma Ray - Dual Induction - SP - Caliper
 - c) Digital Sonic - Gamma Ray
 - d) Formation Tester
 - e) Cement Bond Log for Surface Casing and Long String
 - f) Cement Evaluation Log for Long String
- 3) After drilling to 6450 feet depth
 - a) Gamma Ray - SP - Dual Induction - Caliper
 - b) Gamma Ray - Neutron - Density
 - c) Temperature Log
 - d) Cement Bond Log
- 4) After cleaning the well and swabbing
 - a) Temperature Log

b) Injection Tracer Log.

Copies of all the above logs are included in Appendix D.

Well Integrity Test:

All the casings (9 5/8", 7" and 4 1/2") used in the construction of the well were purchased new and had been manufactured to API standards. Also, all purchased casings and tubings were inspected by Tuboscope Company for any potential defects.

Cement jobs for each casing string were inspected by running Cement Bond Logs and a Cement Evaluation Log. Copies of these logs are included in Appendix D and they show fair to good bonding.

The tubing and packer were installed in the well on February 5, 1992 and the annulus was filled with water containing corrosion inhibitor (Halliburton Anhib). The packer and wellhead were pressure tested to 1000 psi and it was holding. The chart and job reports are shown in Exhibit L-7.

After completing surface facilities and testing of the well, another mechanical integrity test (MIT) was conducted in the presence of the U.S. EPA representative on October 9, 1992. The well annulus was pressurized to 309 psig and observed for half an hour and the IMCO injection well passed the MIT. The report of this test is included in Exhibit L-7.

Since 1992, during operation, no failures have been encountered in the well. Another MIT was conducted on October 28, 1997 in the presence of a U.S. EPA Region IV representative and the MIT was successful. The report of this test is included in Exhibit L-7.

EXHIBIT L-1

**SURFACE (9 5/8") AND LONG STRING (7") CASING
PURCHASE TICKETS**

READD

OR

15691 INVOICE NO. N^o 15**READD SUPPLY, INC.**

26206 OAK RIDGE DRIVE

SPRING, TEXAS 77380

(713) 367-6046

S 1183

O IMCO RECYCLING

D PO BOX 1070

T SAPULPA

O

OK 74057

Remit To:

Readd Supply, Inc.

P. O. Box 2358

Spring, Texas 77383-2358

INVOICE DATE : 08/20/

TERMS : 2% 10/NET

H IMCO

I C/O HYW 70 & GARDNER LANE

P

T MORGANTOWN

O

KY 42261

| Salesman | Customer Order No. | Ship Via | F.O.B. | Date Shipped |
|---|--------------------|--------------|-------------|--------------|
| HOUSTON | VERBAL | TEAM AMERICA | DESTINATION | 08/09/ |
| DESCRIPTION | QUANTITY | | PRICE | AMOUNT |
| | Jts. | Footage | | |
| TO SANDBLAST :: | 1 | 1.00 | \$400.0000 | \$400.00 |
| 7" 23# K55- 7(313.40) | | | | |
| 825.10 9 5/8" 36# IK55 :STC | 11 | 475.70 | \$14.0500 | \$6,68 |
| SMLS R3 | | | | |
| 826.11 7" 23# K55 ILTC | 58 | 2568.70 | \$9.5500 | \$24,53 |
| SMLS R3 | | | | |
| INSPECTION REPORT & TALLY ATTACHED | | | | |
| <div style="border: 2px solid black; padding: 5px; display: inline-block;"> RECEIVED AUG 23 1991 </div> | | | | |

AUG 29 1991

(NOTE: Discount in the amount of \$632.29
allowed if payment is received by
08/30/91 .

TOTAL INVOICE: \$31,6

Release No. RS#4876

NO CREDIT ALLOWED ON GOODS RETURNED WITHOUT PERMISSION.
DUE AND PAYABLE IN MONTGOMERY COUNTY TO READD SUPPLY, INC.

THERE WILL BE A SERVICE CHARGE OF
PER MONTH ON ACCOUNTS AFTER 30

Stacy Adams, PhD
 Associate Professor
 Department of Psychology
 University of North Carolina at Chapel Hill

Shipper's No. ()

Carrier's No.

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of the Bill of Lading,
 at London Dec 1 19 17 From New York

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back thereof, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Mail or street address of consignee—for purposes of notification only)

Mail or street address of consignee—for purposes of notification only)

Address *

Address *

*To be filled in only when shipper desires and governing tariffs provide for delivery thereof)

111

Car or Vehicle Initials

No.

| No. Packages | Kind of Package, Description of Articles, Special Marks, and Exceptions | "WEIGHT" (Subject to Correction) | Class or Rate | Check Column |
|-----------------|---|--|------------------|-----------------|
| 111 | 1-36" X 36" A-35 | 17.125 | | |
| | A-35 | 17.125 | | |
| | T-100 | 17.125 | | |
| | B-37-3101 - 3102 | | | |

Subject to Section 7 of Conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor)

If charges are to be prepaid, write or stamp here: "To be Prepaid."

Received \$ _____
to apply in prepayment of the charges on the property described herein.

Agent or Cashier

Per _____
(The signature here acknowledges only the amount prepaid.)

Charges Advanced:

\$ _____

(Shipper's imprint in lieu of stamp; not a part of Bill of Lading approved by the Interstate Commerce Commission.)

Agent. Per _____

Wilson Jones
14-202 & 9000 PHOTOCOPYING U.S.A.
Carbonless

This Memorandum is an acknowledgment that a Bill of Lading has been issued and is not the Original Bill of Lading, nor a copy or duplicate, covering the property named herein, and is intended solely for filing or record.

Shipment's No. _____ Shipper's No. _____
 Carrier's No. _____
VSPC Transportation - Team America

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of the Bill of Lading.

at Houston, Texas Aug 9 19 91 From AMERICAN PIPE
 the property described below, in apparent good order, except as noted (contents and conditions of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning the carrier or carriers who are to transport the property to its final place of delivery at said destination, if on its own route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or part of the property to be transported, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Freight Classification and Tariff (U.F.C.) in effect on the date of shipment, or (2) in the applicable motor carrier classification or tariff if this is motor carrier shipment.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back thereof, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consigned to Read Supply Co Inc (Mail or street address at consignee—For purposes of notification only)
502 - 526 - 5600

Destination Maryland State Ky Zip County 414 70 Delivery Address 414 70

Route Gardner Lane
 *To be filled in only when shipper desires and governing tariffs provide for delivery thereof

Delivering Carrier Valley 418 Car or Vehicle Initials _____ No. _____

| No. Packages | Kind of Package, Description of Articles, Special Marks, and Exceptions | WEIGHT (Subject to Classification) | Class or Rate | Check Column | Subject to Section 7 of Conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. |
|--|---|------------------------------------|---------------|--------------|---|
| 2132 | 17" X 23 1/2" Black Pipe | | | | (Signature of Consignor) |
| | Release 2567 | | | | If charges are to be prepaid, write or stamp here: "To be Prepaid." |
| | Total Freight | 423.9 | | | Received \$ _____ to apply in payment of the charges on the property described hereon. |
| | 800-537-3101 - July 13 | | | | Agent or Cashier |
| *If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is carrier's or shipper's weight. NOTE—Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding _____ per _____ | | | | | Per _____ (The signature here acknowledges only the amount prepaid) |
| The fibre boxes used for this shipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of the Consolidated Freight Classification. | | | | | Charges Advanced: _____ |
| | | | | | Shipper's imprint in lieu of stamp not a part of bill of lading approved by the Interstate Commerce Commission. |

Raymond Jones Shipper, Per _____ Agent, Per _____
 Permanent post-office address of shipper: _____

BUCKBOARD CARRIERS, INC.

This is your ORIGINAL INVOICE
(non-negotiable)

BK-200

SHIPPER NO. 9165 70

Shipper

713-367-6046

AMERICAN PIPE INSD

3812. OATES RD.

HOUSTON TEXAS

3680 Shepard Road • P.O. Box 648 • Perry, Ohio 44081

PRO NO. 081-059

DATE

8-16-91

The original paid freight bill must be surrendered
with claims for overcharge, loss or damage.

Phone (Area Code 216) 259-5257

Fax 216-259-3841

Consignee

READY SUPPLY

CP MORGAN TOWN KY

Tractor No. 104 Trailer No. 104A

| No. Pieces | DESCRIPTION | WT/MILES | RATE | TOTAL CHGS. | Received in good condition except as noted. |
|------------|--|----------|------|-------------|--|
| 37 | PC. 17" X 23" KSS & JLC "1326.40" 7" 23" KSS & R 32X SANDBLAST, 1 FL FTS 31340 | 37.715 | | | Firm Keith Helton By Keith Helton NOTICE: Demurrage charges on scheduled shipments as follows: \$7.50 per quarter hr. after the first 2 hrs. Pick up date Del'd date Time In Time Out Driver |

ICC REGULATIONS REQUIRE PAYMENT
OF THIS BILL IN 7 DAYS.

WHITE COPY - DELIVERY CANARY COPY - CUSTOMER PINK COPY - DRIVER

EXHIBIT L-2

**LINER CASING (4 1/2") TALLY AND
PURCHASE TICKETS**

TUBOSCOPE INC.
PIPE TALLY SHEET

DATE 11/22/91

CUSTOMER READD SUPPLY

DISPOSAL WELL

LOCATION EDMOND, OK. REC. PLANT W/O NO. 245489

SIZE 4 1/2" WEIGHT 10.50 LB/FT. GRADE K-55

TYPE OF CONNECTIONS STIC MFG. USS

TYPE OF COATING 1 WHITE BAND (TAILED THROSON)

| | FEET | | FEET | | FEET | | FEET | | FEET | |
|----|------|----|------|----|------|----|------|--|------|--|
| 1 | 40 | 18 | 44 | 61 | 44 | 66 | | | | |
| 2 | 44 | 90 | 39 | 43 | 44 | 05 | | | | |
| 3 | 44 | 92 | 44 | 15 | 44 | 26 | | | | |
| 4 | 44 | 91 | 44 | 75 | 42 | 41 | | | | |
| 5 | 44 | 97 | 44 | 97 | 44 | 31 | | | | |
| 6 | 44 | 97 | 36 | 54 | 43 | 42 | | | | |
| 7 | 44 | 62 | 44 | 93 | 44 | 28 | | | | |
| 8 | 44 | 96 | 44 | 91 | 43 | 37 | | | | |
| 9 | 44 | 97 | 40 | 71 | 42 | 19 | | | | |
| 10 | 38 | 02 | 44 | 56 | 44 | 31 | | | | |
| 11 | 44 | 62 | 44 | 98 | 44 | 36 | | | | |
| 12 | 44 | 94 | 41 | 50 | 41 | 82 | | | | |
| 13 | 44 | 83 | 43 | 32 | 44 | 39 | | | | |
| 14 | 44 | 61 | 35 | 73 | 42 | 98 | | | | |
| 15 | 44 | 96 | 44 | 31 | 44 | 04 | | | | |
| 16 | 45 | 72 | 42 | 82 | | | | | | |
| 17 | 44 | 91 | 45 | 53 | | | | | | |
| 18 | 44 | 65 | 44 | 26 | | | | | | |
| 19 | 44 | 92 | 44 | 30 | | | | | | |
| 20 | 44 | 91 | 44 | 36 | | | | | | |
| | 886 | 49 | 860 | 67 | 654 | 85 | | | | |

NO PIECES 55 NO FEET 2,402.01'

TALLIED BY Ray R. Galt

Carrier's Name:

ALANIX TRUCKING CO., INC.

Carrier's No.

46006

RECEIVED, subject to the classifications and liability fixed tariffs in effect at the date of the issue of this bill of lading.

at STANDARD OIL

(Date)

11/22

19

91FROM RAVAIL KENT

the property described below, at apparent gross weight, except as noted hereunder, and compliance of contents of packages with legal, marked, consigned, and delivered as shown herein, which said company (the said company being understood to be the carrier) is hereby acknowledged to be the carrier of the property under the contract of carriage, and to be the carrier of the property at said destination, if on its own railroad, water line, highway, or other mode of transport, or within the territory of its highway operations, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as in each carrier of all or any portion of said route to destination, and as in each party at any time intervening in all or any of said property, that every service to be performed hereunder shall be subject to all the conditions and published by law, whether printed or written, hereto contained, including the conditions on back hereof, which are hereby agreed to by the shipper and accepted for himself and his assigns.

Consigned TO ALANIX TRUCKING CO., INC.

On Order of (Delivery Statement, No. 1000 "COO" must appear before consignee's name or as otherwise provided in Item 423, Sec. 1)

Destination

County

KENTUCKY

Steel

11/22/91

State

City

Zip

Route Physical

County

KENTUCKY

Delivery Address

State

City

Zip

Delivering Carrier Kentucky

County

KENTUCKY

Car or Vehicle Initials and No.

1005/4800

Collect on Delivery \$

And Remit to

City

State

Zip

City

State

Zip

City

Zip

(Signature of consignor)

C. O. D. Charges to be paid by

☐ Shipper ☐ Consignee

If charges are to be prepaid, write or stamp "Prepaid" on the freight bill.

ALANIX

Received by _____ in reply in prepayment of the charges on the property described herein.

Agent or Cashier

By _____ (The signature here signifies only the amount payable)

Charges Advanced: PR

1. The three conditions used for this shipment conform to the specifications set forth in the back matter's certificate thereon, and all other requirements of Rule 41 of the Uniform Freight Classification, and all other requirements of Rule 5 of the National Motor Freight Classification.

2. Shipper's receipt in lieu of stamp not a part of bill of lading agreement by the Interstate Commerce Commission.

Agent must detach and retain the Original Bill of Lading.

Payment post-office address of shipper.

RAVAIL KENTShipper, Per PR

2

READD SUPPLY, INC.
25206 OAK RIDGE DRIVE
SPRING, TEXAS 77380
(713) 367-6046

READD SUPPLY, INC.
P. O. Box 2358
Spring, Texas 77383-2358

INVOICE DATE : 11/25/91

TERMS : 2% 10/NET 30

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1183

IMCO RECYCLING
P. O. BOX 1070
SAPULPA, OK. 74057

S
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IMCO
C/O MORGANTOWN, KY

| Salesman CULLISON | Customer Order No. VERBAL | Ship Via E.L. FARMER | F.O.B. LOADED TRUCKS | Date Shipped 11/22/9 | |
|--|------------------------------|-------------------------|-------------------------|-------------------------|-----------|
| DESCRIPTION | | QUANTITY | | PRICE | AMOUNT |
| | | Jts. | Footage | | |
| 994.10 4 1/2" 10.50# K55 STC SMLS R3 OUTBOUND AFTER INSPECTION | | 55 | 2402.01 | \$5.9500 | \$14,291. |

NOTE: Discount in the amount of \$285.83
allowed if payment is received by
12/05/91.

TOTAL INVOICE: \$14,291

Release No. RS#5108

NO CREDIT ALLOWED ON GOODS RETURNED WITHOUT PERMISSION.
DUE AND PAYABLE IN MONTGOMERY COUNTY TO READD SUPPLY, INC.

THERE WILL BE A SERVICE CHARGE OF 1
PER MONTH ON ACCOUNTS AFTER 30 DA

EXHIBIT L-3

LINER HANGER AND HANGER JOB
DATA

- (1) WHITE-DISTRICT FILE
(2) YELLOW-QA HOUSTON
(3) PINK-REG'N. MGR.

For Eng. Use Only:

1 2 3 4 5 6 7 8 9 0

___ Normal Job
___ Unsatisfactory Job
___ Interim/Prototype Job

Customer IMCO Recycling Inc. Date 1-27-91
Field/Block _____ Lease IMCO Injection
Dist. Mgr. _____ BST District Okla. City, Ok.

SSI# 717-76876 717-76877
Well 1
Job Log No. _____

1. WELL INFORMATION: Cased Hole Depth 2542 Open Hole Depth 6450
Deviation _____ True Vertical Depth 6450
Hole Problems (lost circulation, tight spot, etc.): Tight @ 4429'
Csg. size 7 Weight 23 Grade K-55 Shoe @ 2542

2. LINER INFORMATION: Size 4 1/2 Weight 10.5 Grade K-55 Threads 8RD ST #C
Length 2399.38 Top 2318.62 Overlap 223.38 Pick-up Wt. 40 Slack-off Wt. 32

3. DRILL PIPE: Size 2 7/8 Weight 7.9 Grade N-80 top
Size _____ Weight _____ Grade _____ btm Running Speed 1 min. st
Hung Liner 1732' off Btm @ 4718'

| Tool Description | Commodity No. | O.D. | I.D. | Length | Depth | Y/I |
|------------------------------|---------------|--------|-------|---------|---------|-----|
| Formation Pkr. Pack-off Shoe | | 53/4 | 4.052 | 242 | 4715.58 | Y |
| 1 Jt. 4 1/2" 10.5# K-55 | | 4 1/2 | 4.052 | 35.35 | 4680.29 | |
| LANDING COLLAR | | 5 | 4.052 | .92 | 4679.31 | Y |
| 54 Jts. 4 1/2" 10.5# K-55 | | 4 1/2 | 4.052 | 2354.56 | 2324.75 | |
| X-over Bshg. | | 5 9/16 | 4.052 | .75 | 2324.00 | Y |
| Hyflo HANGER | | 5 | 4.276 | 4.29 | 2319.71 | Y |
| R.H. Sleeve | | 5 3/4 | 4.276 | 1.09 | 2318.62 | Y |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

4. SETTING RESULTS: _____ psi applied to set hydraulic hanger. Pressure to shear out seat in #2 landir collar _____ (if applicable). Did hanger set? (yes ☒ or no _____). Rounds to release setting tool 10
Press. to Rel. Hyd. Setting Tool _____. Right-hand set ☒, or left-hand set _____? Rounds to set hanger 2
Picked up 3 to check for liner weight loss. Total weight loss 22 K

5. CONDITIONING: Mud circulated after liner on bottom 2 hours @ 2 1/2 bbls/minute. Mud weight 8.8
Maximum pressure 350 circulated before (_____) or after (_____) hanger was se

6. CEMENT JOB: Weight on setting tool while cementing 16 K. Cemented by Dowell
Calculated pumping time 2 hr. 15 min. Pumped water or spacer ahead of cement 20 BBLs. Behind ceme Water. Cement weight 14.8. Percent of excess 35 % Start mixing @ 0250
Finish displacing plug at 0355. Max. pressure 1300. Displacement rate 5

7. PLUG DISPLACEMENTS: Pumpdown plug bumped up at 12. Calculated displacement 12
Pressure from 710 to 790 to shear plugs. Liner wiper plug bumped up at 50
Calculated displacement 49.7. Pressure plugs bumped at 1300 To 2000.

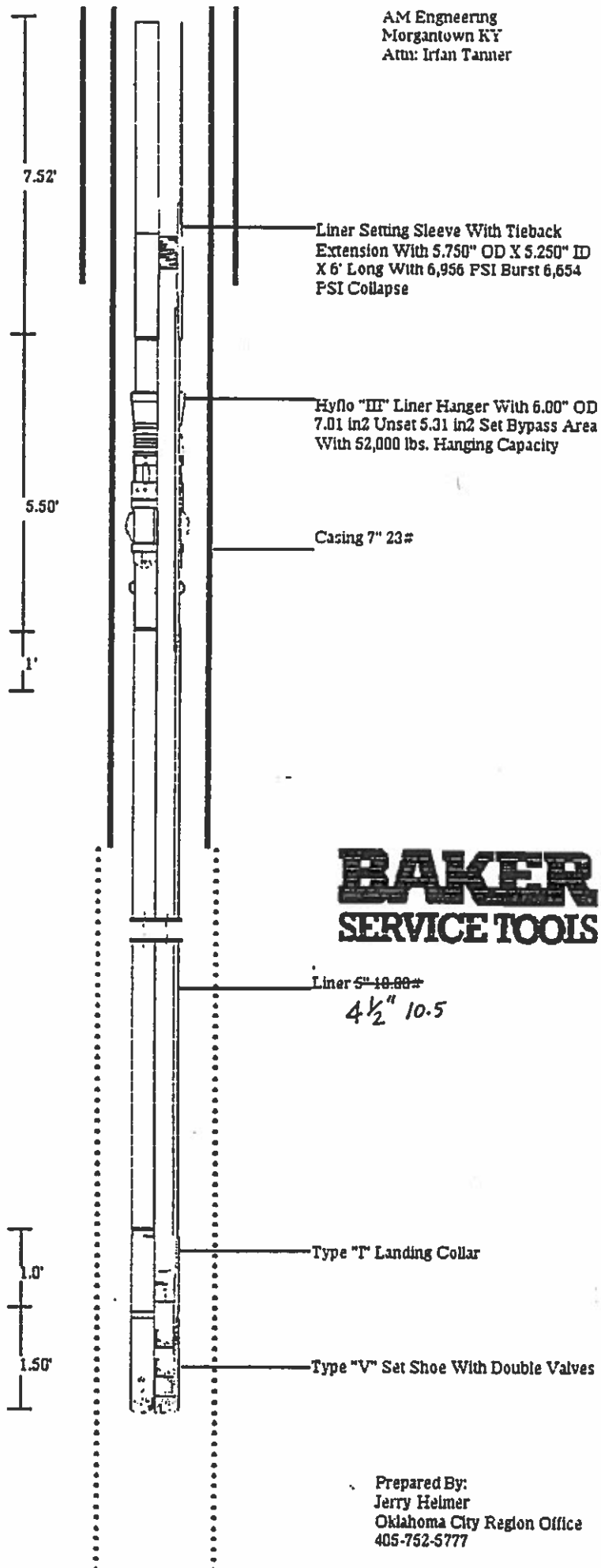
8. FOLLOW-UP ACTION REQ'D: ☐ Yes ☐ No

9. COMMENTS: _____

Johnny C. Raydale
Baker Rep. Signature

Irvin Trum
Customer Rep. Signature

AM Engineering
Morgantown KY
Attn: Brian Tanner



Prepared By:
Jerry Helmer
Oklahoma City Region Office
405-752-5777



SALES & SERVICE INVOICE

REMIT TO: BAKER SERVICE TOOLS P.O. BOX 200415 HOUSTON, TEXAS 77216

FORM BSI 20 80 (REV. 7/80)

7-76877

TERMS: NET 30 DAYS FROM DATE OF INVOICE

A Baker Hughes company

P.O. BOX 40129, HOUSTON, TEXAS 77240

DATE ISSUED

11-25-91 Okla. City, Ok.

SHIPPED FROM: (DISTRICT)

| SHIP TO | | SHIP FROM | | SHIP VIA | | SHIP DATE | | SHIP TIME | | SHIP AMOUNT | |
|---------|-----|---|--|----------|--|-----------|--|-----------|--|-------------|---------|
| SOLD TO | | SOLD FROM | | SOLD VIA | | SOLD DATE | | SOLD TIME | | SOLD AMOUNT | |
| SOLD TO | | SOLD FROM | | SOLD VIA | | SOLD DATE | | SOLD TIME | | SOLD AMOUNT | |
| SOLD TO | | SOLD FROM | | SOLD VIA | | SOLD DATE | | SOLD TIME | | SOLD AMOUNT | |
| 1 | 1 | 5" DRH Setting Tool w/ Swab cups | | | | | | | | | 398.00 |
| 2 | 1 | 3 1/2 Dropping Head | | | | | | | | | 457.00 |
| 3 | 1 | Sub 2 1/8 BEUCED box x 3 1/4" x 15' COPY | | | | | | | | | 42.00 |
| 4 | 1 | Sub 2 1/8 PH-6 Hybrid (copy) x 15' BEUCED | | | | | | | | | 42.00 |
| 5 | 1 | 3 1/2 IFB PH-6 BEUCED x 15' BEUCED | | | | | | | | | 42.00 |
| 6 | 1 | 2 1/2 IFB PH-6 BEUCED x 15' BEUCED | | | | | | | | | 42.00 |
| 7 | 2 | Service Tool Mileage Round Trip | | | | | | | | | 1994.00 |
| 8 | 400 | Blacklight inspecting of central Texas | | | | | | | | | 440.00 |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |
| | | | | | | | | | | TAX | |
| | | | | | | | | | | TOTAL | |

SIGNED FOR BAKER SERVICE TOOLS

AGENT OF OWNER OR CONTRACTOR: Johnny C. Regalado

AGENT OF OWNER OR CONTRACTOR: Tommy Tamm

CHARGES ARE SUBJECT TO CORRECTION BY OUR INVOICING DEPARTMENT IN ACCORDANCE WITH LATES PRICE SCHEDULES AND THE ADDITION OF APPLICABLE

EXHIBIT L-4

**TUBING (3 1/2" AND 2 7/8") TALLY, PURCHASE TICKETS
AND TECHNICAL DATA FOR 2 7/8" TUBING**

OFFICE: 5432 E. 5th Place
TULSA, OKLA. 74112

H. CHAPMAN
Phone 836-5810, Tulsa, Okla. 74112

CHAPMAN
OIL & GAS WELL SALVAGING CO.
HYDRAULIC CASING PULLING CONTRACTORS
TULSA, OKLA.

| COMPANY <u>IMCO Remying Inc</u> | | | | | | DATE <u>2-5-92</u> | | | | | |
|---------------------------------------|------|----------------------|------|-------------------------|------|-------------------------------|------|--------------------|------|----------------------------------|--|
| LEASE NAME <u>Imco Disposal No. 1</u> | | | | | | LOCATION <u>Butterfly Key</u> | | | | | |
| Size O.D. <u>3 1/2</u> | | Weight <u>9.3</u> | | Thread <u>8R1EUE</u> | | <u>N-80</u> #55 | | Kind <u>New</u> | | <u>Interwilly</u> <u>Leat</u> | |
| Jts. | Feet | Ins. | Feet | Ins. | Feet | Ins. | Feet | Ins. | Feet | Ins. | |
| 1 | 30 | 81 | 30 | 60 | 30 | 74 | 30 | 71 | 30 | 93 | |
| 2 | 30 | 67 | 30 | 58 | 30 | 78 | 30 | 70 | 30 | 62 | |
| 3 | 30 | 63 | 30 | 84 | 30 | 81 | 30 | 83 | 30 | 68 | |
| 4 | 30 | 81 | 30 | 44 | 30 | 44 | 30 | 64 | | | |
| 5 | 30 | 61 | 30 | 61 | 30 | 83 | 30 | 50 | | | |
| 6 | 30 | 89 | 30 | 53 | 30 | 66 | 30 | 94 | | | |
| 7 | 30 | 69 | 30 | 89 | 30 | 76 | 30 | 64 | | | |
| 8 | 30 | 48 | 30 | 78 | 30 | 78 | 30 | 72 | | | |
| 9 | 30 | 65 | 30 | 74 | 30 | 37 | 30 | 49 | | | |
| 10 | 30 | 38 | 30 | 79 | 30 | 59 | 30 | 83 | | | |
| 11 | 30 | 93 | 30 | 79 | 30 | 64 | 30 | 75 | | | |
| 12 | 30 | 75 | 30 | 69 | 30 | 45 | 30 | 44 | | | |
| 13 | 30 | 58 | 30 | 43 | 30 | 63 | 30 | 61 | | | |
| 14 | 30 | 43 | 30 | 84 | 30 | 83 | 30 | 13 | | | |
| 15 | 30 | 60 | 30 | 53 | 30 | 71 | 30 | 75 | | | |
| 16 | 30 | 63 | 30 | 80 | 30 | 52 | 30 | 53 | | | |
| 17 | 30 | 73 | 30 | 71 | 30 | 58 | 30 | 53 | | | |
| 18 | 30 | 88 | 30 | 79 | 30 | 70 | 30 | 85 | | | |
| 19 | 30 | 65 | 30 | 63 | 30 | 82 | 30 | 93 | | | |
| 20 | 30 | 89 | 30 | 97 | 30 | 95 | 30 | 81 | | | |
| Total | 613 | 59 | 613 | 98 | 613 | 59 | 612 | 83 | 92 | 23 | |
| Tallied By <u>[Signature]</u> | | | | | | Totals | | | | | |
| Received By <u>[Signature]</u> | | | | | | Joints 83 | | Feet 2546 | | Ins. 23 | |

Cr DE: 5432 E. 5th Place
TULSA, OKLA. 74112

H. CHAPMAN
Phone 836-5810, Tulsa, Okla. 74112

CHAPMAN
OIL & GAS WELL SALVAGING CO.
HYDRAULIC CASING PULLING CONTRACTORS

TULSA, OKLA.

| COMPANY <u>IMCO Recycling Inc.</u> | | | | | | | | | | DATE <u>2-5-92</u> | |
|------------------------------------|------|----------------------|------|----------------------|------|-------------|------|--------------------|--------------|----------------------------------|------|
| LEASE NAME <u>IMCO DISPOSAL</u> | | | | | | | | | | LOCATION <u>Burton 66 1/2 Ky</u> | |
| Size O.D. <u>2 7/8</u> | | Weight <u>6.4</u> | | Thread <u>RFL</u> | | <u>J-55</u> | | Kind <u>New</u> | | <u>in factory Coated</u> | |
| Jts. | Feet | Ins. | Feet | Ins. | Feet | Ins. | Feet | Ins. | Feet | Ins. | |
| 1 | 31 | 33 | 31 | 38 | 31 | 38 | 30 | 02 | | | |
| 2 | 31 | 41 | 31 | 25 | 31 | 13 | 31 | 40 | | | |
| 3 | 31 | 40 | 31 | 39 | 31 | 12 | 31 | 44 | | | |
| 4 | 31 | 40 | 31 | 40 | 31 | 38 | 31 | 40 | | | |
| 5 | 31 | 39 | 30 | 98 | 30 | 88 | 31 | 41 | | | |
| 6 | 31 | 40 | 31 | 26 | 31 | 39 | 31 | 40 | <u>Picks</u> | <u>7.00</u> | |
| 7 | 31 | 42 | 31 | 43 | 31 | 39 | 31 | — | <u>Sub</u> | <u>6.10</u> | |
| 8 | 31 | 15 | 31 | 43 | 31 | 43 | 31 | 33 | <u>Sub</u> | <u>1.10</u> | |
| 9 | 31 | 13 | 31 | 38 | 31 | 42 | 31 | 14 | | | |
| 10 | 31 | 39 | 31 | 02 | 30 | 72 | 31 | 39 | | | |
| 11 | 31 | 32 | 31 | 40 | 31 | 38 | 31 | 40 | | | |
| 12 | 31 | 41 | 31 | 38 | 31 | 28 | 31 | 43 | | | |
| 13 | 31 | 26 | 31 | 41 | 31 | 41 | 31 | 40 | | | |
| 14 | 31 | — | 31 | 39 | 31 | 41 | 31 | 43 | | | |
| 15 | 30 | 93 | 31 | 43 | 31 | 42 | 31 | 10 | | | |
| 16 | 31 | 10 | 31 | 48 | 31 | 09 | 30 | 92 | | | |
| 17 | 30 | 56 | 30 | 72 | 31 | 39 | 31 | 41 | | | |
| 18 | 31 | 41 | 30 | 66 | 30 | 72 | 31 | 40 | | | |
| 19 | 31 | 42 | 31 | 40 | 30 | 77 | 31 | 40 | | | |
| 20 | 31 | 04 | 31 | 39 | 31 | 40 | | | | | |
| Total | 623 | 19 | 625 | 58 | 624 | 51 | 593 | 82 | | | |
| Tallied By <u>B. A. A.</u> | | | | | | | | | | Totals | |
| Received By <u>B. A. A.</u> | | | | | | | | | | Joints | Feet |
| | | | | | | | | | | 79 | 2467 |
| | | | | | | | | | | | Ins. |
| | | | | | | | | | | | 10 |

Team America Inc.

TH9177

(214) 775-5476

Invoice

Readd Supply
26206 Oakridge Drive
Spring, TX 77380

IMCO
KS#5141
INV 10516

| | |
|--|-------------------------|
| TH9177 | DATE BILLED 01-02-92 |
| Readd Supply c/o IMCO Morgantown, KY | |

| QUANTITY | DATE SHIPPED | CARRIER | TERMS | ORDER NUMBER |
|---|---|--------------------------|----------|--------------|
| 79 | 12-21-91 | Team America Trucklines | Net 7 | RS5141 |
| | DESCRIPTION | | RATE | CHARGE |
| 1 | 2 7/8 6-4 - RPC J55 R2 3 1/2 x 2/7/8 Crossover | 15,380# 88 45,000# | 2.29 cwt | \$1030.50 |
| | TUBESCOPE Houston, TX | 4104 | 110 | |
| Invoice for the freight charges paid or in your behalf and may include service and/or commissions when applicable. REMIT TO: Team America, Inc. P.O. Box 731 Midlothian, Texas 76065-0731 | | | | \$1030.50 |
| PAY THIS AMOUNT | | | | \$1030.50 |

br Invoice for the freight charges paid or in your behalf and may include service and/or commissions when applicable.

30 DAYS
Late Charge On All Past Due Balances
183070

FORM NO 608 REV 7/80

Carrier's No. Shipper's No. 245785
At HOUSTON TX 12-21-19 91 From NEW YORK COATING

Consigned to KENDALL P/O 2706
Destination MOBILE AL State AL County Delivery Address

Reels 74
Delivery Carrier Car Initials Car No.

| PIECES | Description of Articles, Special Marks and Exceptions | GALLONS | WEIGHT (S.G. to Gr.) | CLASS OR RATE | CHECK COL. |
|--------|---|---------|-------------------------|------------------|---------------|
| 79 | COATING 10 W/TK 77 | | | | |
| 1 | 2 7/8 - 6.5 - RFL - JES - K2 - 77 | | | | |
| | 3 1/2 x 2 7/8 CIRCULAR | | | | |
| | FEEDING: 24814 | | 15.830 | | |

NOTE: If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is carrier's or shipper's weight. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding

TELESCOPE INC.

Permanent post office address of shipper;

Per

MADE IN U.S.A.

Form 200/Rev.

RFC™

Flush OD liner connector

30° torque shoulder and metal seal

This external torque shoulder ensures the pin and box are exactly positioned. Most of the makeup torque is applied to this shoulder, which generates a metal seal for collapse pressure rated to the API minimum collapse rating for the pipe. This seal also serves as a backup to the pin nose seal.

Two-step thread design

This non-tapered, noninterference thread form minimizes galling and thread-generated stresses.

Center-step torque shoulder

This shoulder performs as an additional torque shoulder, storing a small amount of torque and helping to prevent overmakeup.

14° metal seal

This pin nose seal is created by radial interference and is rated to the API hydrostatic test pressure for the pipe.

Formed pin member

The pin end is swaged inward and then machine bored to ensure proper pin nose seal geometry without restricting driftability. This forming is done at ambient temperature, prior to threading, and is stress relieved.

Interchangeability

The RFC design is interchangeable with the Hydril FJ™ connector, except for those weights indicated in the adjacent tables.



RFC

| Pipe data | | | | | | Connector data | | | | | | Connector strength data | | | | | | | | | | | | | | | |
|-----------|----------------|------------------|------------------------|------------|----------|----------------|--------------|----------------------|----------------------------|-----------------------|--------------------------------|-------------------------|-----------------------|-------------------|-----------------------|-------------------|-----------------------|-------------------|-----------------------|-------------------|-----------------------|-------------------|-----------------------|----------|----|----------|--|
| Size | Nominal weight | Plain end weight | Nominal wall thickness | Nominal ID | API spec | Bore ID | Make-as loss | Connector tension | Nominal tension efficiency | Connector compression | Nominal compression efficiency | J-55 | | K-55 | | L-80 | | N-80 | | High Collapse 95 | | P-105 | | P-110 | | | |
| | | | | | | | | cross-sectional area | | cross-sectional area | | Min. parting load | Setting depth FOS=1.5 | Min. parting load | Setting depth FOS=1.5 | Min. parting load | Setting depth FOS=1.5 | Min. parting load | Setting depth FOS=1.5 | Min. parting load | Setting depth FOS=1.5 | Min. parting load | Setting depth FOS=1.5 | | | | |
| in | lb/ft | lb/ft | in | in | in | in | in | in ² | % | in ² | % | 1,000 lb | in | 1,000 lb | in | 1,000 lb | in | 1,000 lb | in | 1,000 lb | in | 1,000 lb | in | 1,000 lb | in | 1,000 lb | |
| | | | | | | | | | | | | J-55 | | | | | | | | | | | | P-105 | | | |
| 2-3/8 | *4.70 | 4.43 | 0.190 | 1.395 | 1.901 | 1.343 | 2.09 | 0.612 | 48.3 | 0.390 | 30.4 | 45 | 3,750 | 58 | 7,290 | 61 | 7,670 | 67 | 8,440 | 73 | 9,290 | | | | | | |
| | 5.95 | 5.75 | 0.254 | 1.587 | 1.771 | 1.517 | 2.05 | 0.964 | 97.0 | 0.484 | 27.2 | 72 | 4,380 | 91 | 3,240 | 38 | 9,310 | 106 | 10,240 | 115 | 11,170 | | | | | | |
| | *6.56 | 6.18 | 0.217 | 1.441 | 2.347 | 2.181 | 2.12 | 0.853 | 48.3 | 0.469 | 26.4 | 58 | 5,040 | 54 | 7,550 | 86 | 8,590 | 26 | 9,350 | 107 | 9,660 | | | | | | |
| 2-7/8 | 7.99 | 7.66 | 0.275 | 2.323 | 2.229 | 2.381 | 2.12 | 0.893 | 39.8 | 0.489 | 20.1 | 88 | 4,790 | 35 | 8,160 | 89 | 8,490 | 98 | 7,110 | 107 | 7,780 | | | | | | |
| | 8.70 | 8.44 | 0.308 | 2.255 | 2.155 | 2.2584 | 2.12 | 0.893 | 38.0 | 0.489 | 19.3 | 56 | 4,400 | 34 | 5,590 | 91 | 5,870 | 98 | 8,460 | 107 | 7,050 | | | | | | |
| | *9.30 | 8.81 | 0.254 | 2.392 | 2.887 | 2.830 | 2.82 | 1.330 | 51.5 | 0.688 | 27.3 | 99 | 6,290 | 125 | 7,380 | 133 | 8,380 | 146 | 9,220 | 159 | 10,050 | | | | | | |
| 3-1/2 | *10.30 | 9.91 | 0.288 | 2.822 | 2.787 | 2.842 | 2.58 | 1.548 | 53.1 | 0.796 | 27.7 | 116 | 6,500 | 147 | 3,240 | 154 | 8,870 | 170 | 3,540 | 185 | 10,410 | | | | | | |
| | *12.30 | 12.31 | 0.368 | 2.754 | 2.839 | 2.834 | 2.88 | 2.064 | 57.0 | 0.989 | 27.1 | 154 | 6,580 | 186 | 8,700 | 208 | 9,190 | 227 | 10,240 | 247 | 11,170 | | | | | | |
| | *12.95 | 12.92 | 0.375 | 2.750 | 2.825 | 2.870 | 2.88 | 2.084 | 56.1 | 0.989 | 28.6 | 154 | 6,880 | 186 | 8,700 | 208 | 9,190 | 227 | 10,370 | 247 | 11,360 | | | | | | |
| 4 | *15.50 | 14.63 | 0.449 | 2.602 | 2.677 | 2.522 | 2.88 | 2.084 | 48.0 | 0.989 | 22.8 | 154 | 5,870 | 198 | 7,440 | 208 | 7,320 | 227 | 8,490 | 247 | 9,400 | | | | | | |
| | 15.80 | 15.37 | 0.476 | 2.548 | 2.423 | 2.468 | 2.88 | 2.064 | 48.6 | 0.988 | 21.7 | 154 | 5,590 | 196 | 7,080 | 208 | 7,460 | 227 | 8,200 | 247 | 8,950 | | | | | | |
| | 3.50 | 9.11 | 0.228 | 3.548 | 4.223 | 4.650 | 2.82 | 1.229 | 46.9 | 0.894 | 33.8 | 92 | 5,820 | 118 | 7,120 | 122 | 7,490 | 133 | 8,140 | 147 | 8,890 | | | | | | |
| 5 | *11.00 | 10.48 | 0.282 | 3.475 | 3.351 | 3.398 | 2.82 | 1.848 | 52.5 | 0.894 | 28.5 | 123 | 6,560 | 158 | 3,320 | 164 | 8,730 | 181 | 8,430 | 197 | 10,380 | | | | | | |
| | *11.60 | 11.34 | 0.288 | 3.428 | 3.303 | 3.348 | 2.82 | 1.863 | 54.0 | 0.894 | 27.2 | 135 | 6,820 | 171 | 8,390 | 180 | 8,830 | 196 | 9,710 | 215 | 10,580 | | | | | | |
| | *13.40 | 12.93 | 0.330 | 3.340 | 3.215 | 3.280 | 2.88 | 1.989 | 52.3 | 1.008 | 25.8 | 148 | 5,440 | 199 | 8,160 | 199 | 8,380 | 219 | 9,440 | 238 | 10,200 | | | | | | |
| | | | | | | | | | | | | K-55 | | | | | | | | | | | | P-110 | | | |
| 4-1/2 | 3.50 | 9.40 | 0.285 | 4.070 | 3.955 | 3.980 | 2.82 | 1.182 | 42.0 | 0.974 | 35.7 | 110 | 6,520 | 110 | 6,520 | 118 | 6,360 | 127 | 7,150 | 145 | 8,580 | | | | | | |
| | 10.50 | 10.23 | 0.224 | 4.382 | 3.927 | 3.982 | 2.82 | 1.405 | 46.7 | 0.974 | 32.8 | 133 | 7,240 | 133 | 7,240 | 140 | 7,630 | 154 | 8,190 | 175 | 9,130 | | | | | | |
| | 11.40 | 11.35 | 0.258 | 4.000 | 3.873 | 3.870 | 2.82 | 1.734 | 51.9 | 0.974 | 29.6 | 184 | 8,080 | 164 | 8,080 | 173 | 8,480 | 190 | 9,130 | 218 | 10,600 | | | | | | |
| 5 | *12.30 | 12.24 | 0.271 | 3.858 | 3.823 | 3.878 | 2.82 | 1.891 | 52.5 | 0.974 | 27.4 | 179 | 8,150 | 179 | 3,150 | 183 | 3,580 | 208 | 9,440 | 238 | 10,720 | | | | | | |
| | *13.50 | 13.24 | 0.290 | 3.920 | 3.795 | 3.940 | 2.82 | 1.891 | 49.3 | 0.974 | 25.8 | 179 | 7,650 | 179 | 7,650 | 180 | 8,050 | 208 | 8,880 | 238 | 10,270 | | | | | | |
| | 15.30 | 14.98 | 0.337 | 3.925 | 3.701 | 3.748 | 2.75 | 2.119 | 52.8 | 1.328 | 30.4 | 220 | 8,170 | 220 | 8,170 | 231 | 8,500 | 255 | 9,440 | 289 | 10,750 | | | | | | |
| 5-1/2 | 18.30 | 18.69 | 0.438 | 3.840 | 3.315 | 3.560 | 2.78 | 2.318 | 42.2 | 1.328 | 24.4 | 220 | 6,540 | 220 | 6,540 | 231 | 6,890 | 255 | 7,330 | 289 | 9,610 | | | | | | |
| | *15.00 | 14.87 | 0.296 | 4.408 | 4.283 | 4.328 | 2.83 | 2.204 | 50.4 | 1.160 | 26.9 | 209 | 7,820 | 209 | 7,820 | 220 | 8,230 | 242 | 9,350 | 275 | 10,280 | | | | | | |
| | 18.00 | 17.93 | 0.352 | 4.278 | 4.151 | 4.198 | 3.00 | 2.808 | 52.2 | 1.479 | 28.3 | 266 | 8,250 | 268 | 8,250 | 276 | 8,590 | 304 | 9,560 | 350 | 10,680 | | | | | | |
| 5-1/2 | 20.30 | 20.01 | 0.404 | 4.184 | 4.059 | 4.104 | 3.00 | 2.808 | 47.7 | 1.479 | 25.4 | 266 | 7,400 | 264 | 7,400 | 280 | 7,790 | 304 | 8,580 | 350 | 9,730 | | | | | | |
| | 20.80 | 20.83 | 0.422 | 4.158 | 4.031 | 4.078 | 3.00 | 2.808 | 46.2 | 1.479 | 24.6 | 266 | 7,170 | 268 | 7,170 | 280 | 7,550 | 304 | 8,310 | 350 | 9,440 | | | | | | |
| | 23.20 | 23.03 | 0.478 | 4.044 | 3.919 | 3.964 | 3.00 | 2.808 | 41.3 | 1.479 | 22.0 | 266 | 6,410 | 268 | 6,410 | 280 | 6,750 | 308 | 7,420 | 350 | 8,440 | | | | | | |
| 5-1/2 | 24.10 | 24.03 | 0.500 | 4.000 | 3.875 | 3.920 | 3.00 | 2.808 | 38.7 | 1.479 | 21.1 | 266 | 6,160 | 268 | 6,160 | 280 | 6,490 | 304 | 7,130 | 350 | 8,100 | | | | | | |
| | 15.50 | 15.35 | 0.275 | 4.950 | 4.825 | 4.870 | 3.37 | 2.230 | 49.4 | 1.303 | 29.2 | 211 | 7,880 | 211 | 7,880 | 223 | 8,070 | 245 | 8,870 | 278 | 10,020 | | | | | | |
| | *17.00 | 16.87 | 0.324 | 4.592 | 4.767 | 4.812 | 3.37 | 2.521 | 50.8 | 1.303 | 28.6 | 238 | 7,340 | 239 | 7,340 | 252 | 7,300 | 277 | 9,130 | 315 | 10,370 | | | | | | |
| 5-1/2 | 20.00 | 19.81 | 0.381 | 4.773 | 4.653 | 4.698 | 3.43 | 2.113 | 52.4 | 1.579 | 27.4 | 295 | 8,290 | 295 | 8,290 | 311 | 8,730 | 342 | 9,500 | 389 | 10,910 | | | | | | |
| | 22.00 | 22.54 | 0.415 | 4.870 | 4.545 | 4.590 | 3.43 | 2.113 | 47.0 | 1.579 | 24.1 | 295 | 7,280 | 295 | 7,280 | 311 | 7,870 | 342 | 8,440 | 399 | 9,580 | | | | | | |
| | 28.00 | 25.54 | 0.475 | 4.544 | 4.423 | 4.468 | 3.43 | 2.113 | 41.4 | 1.579 | 21.2 | 295 | 6,420 | 294 | 6,420 | 311 | 6,770 | 342 | 7,440 | 389 | 8,460 | | | | | | |

1. RFC CONNECTOR PRESSURE RATINGS

COLLAPSE — pressure rated to the API Collapse pressure rating for the pipe body.

INTERNAL — pressure rated to 91.4% of the API Minimum Internal pressure rating for the pipe body.

HYDROSTATIC TEST — pressure rated to 87.5% of the API Hydrostatic pressure rating for the pipe body.

2. RFC designs grouped together by weights, as shown above, are interchangeable with each other.

3. All of the RFC designs displayed above are weaker in tension than the pipe body. The minimum parting loads displayed were calculated by multiplying the connector tension cross-sectional area by the minimum ultimate (tensile) strength for the considered grade of pipe. To calculate this rating for a grade of pipe not displayed, determine the grade's minimum ultimate strength rating and multiply it by the connector tension cross-sectional area. The value assigned as the minimum ultimate strength rating for the high-collapse .95 grade shown above was 110,000 psi, although this value may vary by mill.

4. The setting depth values displayed above were calculated by dividing the connector's minimum parting load rating by the plain end pipe weight in air and the factor of safety displayed. To determine the factor of safety for a particular string length, use the following equation:

$$\text{Factor of Safety (FOS)} = \frac{\text{Connector Minimum Load Rating}}{\text{String Length} \times \text{Pipe Weight in Air}}$$

These values do not consider buoyancy or any other downhole effect and are displayed for reference only.

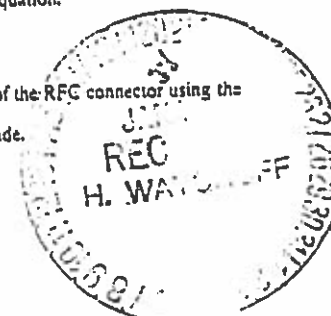
5. The compressive cross-sectional areas listed above can be used to calculate the elastic (yield) compressive strength of the RFC connector using the following equation:

$$\text{Elastic compressive strength} = \text{compressive cross-sectional area} \times \text{minimum yield strength of the considered grade.}$$

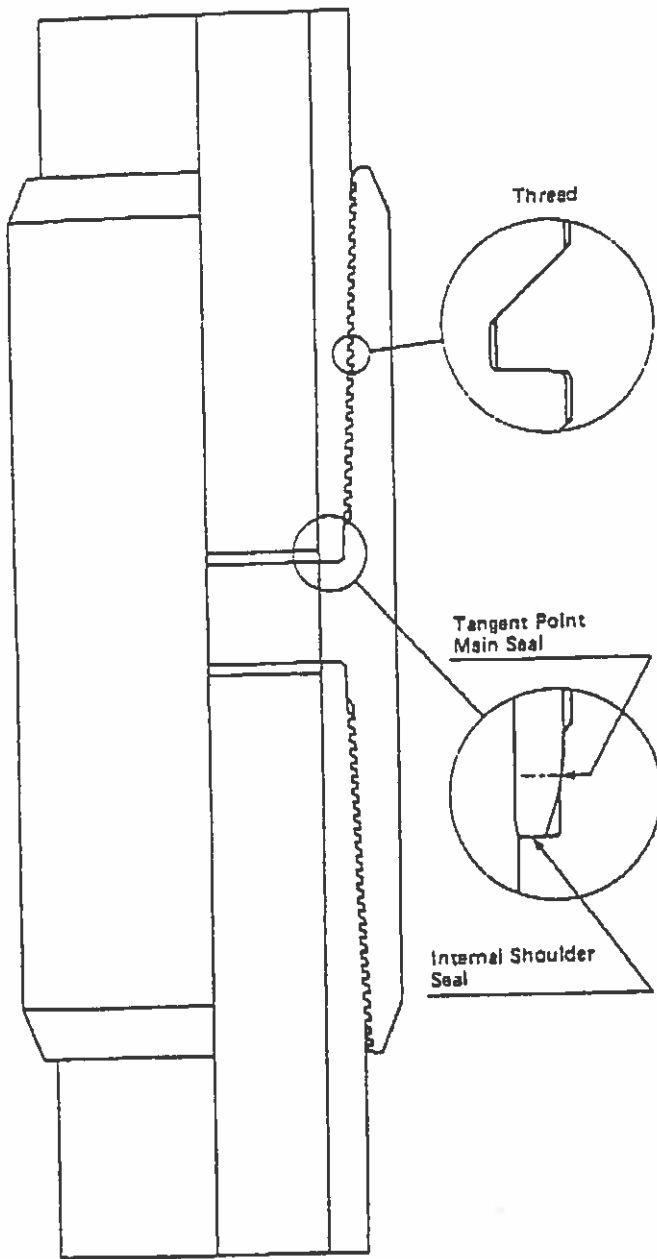
6. Material geometry for accessories is available upon request by calling the Houston facility at 713-230-6350.

a. This is nominal pipe ID and is used as pin ID for accessory blanking purposes.

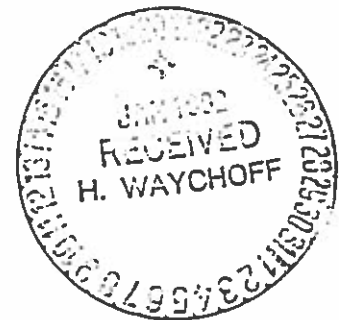
* Interchangeable with Hydril's FI flush OD connector.



DESIGN PRINCIPLE OF NK 3SB TUBING



1. Threaded and Coupled Connection Applied to Non-upset Pipe
2. Two Metal to Metal Seals
Sliding Type Seal with Tangent Point Contact and Internal Shoulder
3. Positive Torque Stop in Internal Shoulder
4. Internal Flush - Smooth Bore
5. Flat Crested Thread Parallel to Pipe Axis
8 Threads per Inch
6. Load Flank Zero degree
Stabbing Flank 45 degrees
7. Tapered and Runout Type Thread
Taper 1/16
8. Precision Machining



RECOMMENDED MAKE-UP TORQUE

NK3SB TUBING (Regular Coupling)

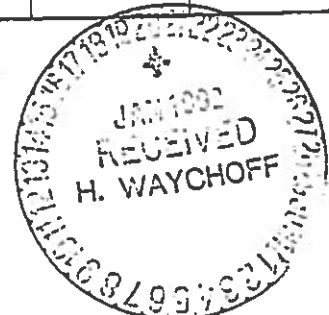
(ft-lbs)

| Size O.D. (in) | Nominal Weight (lb/ft) | Wall Thickness (in) | Grade | | | |
|----------------------|------------------------------|---------------------------|-------|---------------------------|---------------------|---------------|
| | | | J55 | C75 N80 L80 AC80 | AC90 AC95 C95 | P105 NK125 |
| 2-3/8 | * 4.70 | 0.190 | 1,200 | 1,200 | 1,300 | 1,400 |
| | * 5.30 | 0.218 | 1,400 | 1,500 | 1,500 | 1,600 |
| | 5.95 | 0.254 | 1,600 | 1,800 | 1,900 | 1,900 |
| | 6.20 | 0.261 | 1,700 | 1,800 | 1,900 | 1,900 |
| | 7.70 | 0.336 | 2,000 | 2,200 | 2,300 | 2,400 |
| 2-7/8 | * 6.50 | 0.217 | 1,800 | 2,000 | 2,100 | 2,200 |
| | 7.90 | 0.276 | 2,100 | 2,300 | 2,400 | 2,500 |
| | 8.70 | 0.308 | 2,300 | 2,600 | 2,700 | 2,800 |
| | 9.50 | 0.340 | 2,500 | 2,800 | 3,000 | 3,100 |
| | 10.70 | 0.392 | 2,800 | 3,300 | 3,500 | 3,700 |
| | 11.00 | 0.405 | 2,800 | 3,300 | 3,500 | 3,700 |
| | 11.65 | 0.440 | 2,800 | 3,300 | 3,500 | 3,700 |
| 3-1/2 | 9.30 | 0.254 | 2,700 | 2,900 | 3,100 | 3,300 |
| | 10.30 | 0.289 | 3,100 | 3,400 | 3,600 | 3,800 |
| | 12.80 | 0.368 | 3,900 | 4,400 | 4,600 | 4,900 |
| | 12.95 | 0.375 | 3,900 | 4,400 | 4,600 | 4,900 |
| | 15.10 | 0.449 | 4,500 | 5,000 | 5,300 | 5,700 |
| | 15.80 | 0.476 | 4,500 | 5,000 | 5,300 | 5,700 |
| | 16.70 | 0.510 | 4,600 | 5,200 | 5,500 | 5,900 |
| | 17.05 | 0.530 | 4,600 | 5,200 | 5,500 | 5,900 |
| 4 | 11.00 | 0.262 | 3,600 | 4,000 | 4,100 | 4,300 |
| | 13.40 | 0.330 | 4,400 | 5,000 | 5,200 | 5,400 |
| | 19.00 | 0.500 | 6,000 | 6,700 | 7,000 | 7,500 |
| | 22.50 | 0.610 | 6,400 | 7,000 | 7,300 | 7,800 |
| 5 | * 12.75 | 0.271 | 3,500 | 3,900 | 4,100 | 4,300 |
| | 13.50 | 0.290 | 4,200 | 4,700 | 4,900 | 5,200 |
| | 15.50 | 0.337 | 5,000 | 5,500 | 5,800 | 6,300 |
| | 19.20 | 0.430 | 6,000 | 7,000 | 7,500 | 8,000 |
| | 21.60 | 0.500 | 6,200 | 7,500 | 8,000 | 8,500 |
| | 24.00 | 0.560 | 6,500 | 7,700 | 8,500 | 8,700 |
| | 26.50 | 0.630 | 6,500 | 7,700 | 8,500 | 8,700 |

with *

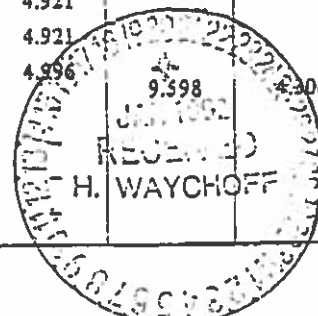
torque values are 110% of optimum torque.
torque values are 90% of optimum torque.

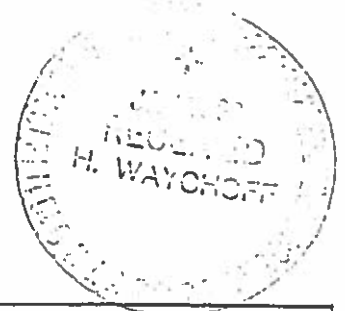
* values are 120% of optimum torque.
values are 80% of optimum torque.
 $\gamma = 0.90 \times \text{Regular}$



DIMENSION & PROPERTIES OF NK 3SB TUBING

| Pipe | | | | | Coupling (in) | | | Pin Length (in) | (A) Pipe Section (Nominal) (Sq. in) |
|--------------|---------------------------|------------------------|---------------------------|------------------------|---------------|---------|----------------|--------------------|--|
| O.D. (in) | Nominal Weight (lb/ft) | Wall Thickness (in) | I.D. (Nominal) (in) | Drift Diameter (in) | O.D. | | Length (in) | | |
| | | | | | Regular | Special | | | |
| 2-3/8 | 4.70 | 0.190 | 1.995 | 1.901 | 2.875 | 2.700 | 8.472 | 3.743 | 1.304 |
| | 5.30 | 0.218 | 1.939 | 1.845 | | 2.700 | | | 1.477 |
| | 5.95 | 0.254 | 1.867 | 1.773 | | 2.732 | | | 1.692 |
| | 6.20 | 0.261 | 1.852 | 1.758 | | 2.744 | | | 1.733 |
| | 7.70 | 0.336 | 1.702 | 1.608 | | - | | | 2.152 |
| 2-7/8 | 6.50 | 0.217 | 2.441 | 2.347 | 3.500 | 3.220 | 8.472 | 3.743 | 1.812 |
| | 7.90 | 0.276 | 2.323 | 2.229 | | 3.280 | | | 2.254 |
| | 8.70 | 0.308 | 2.259 | 2.165 | | 3.323 | | | 2.484 |
| | 9.50 | 0.340 | 2.194 | 2.100 | | 3.366 | | | 2.708 |
| | 10.70 | 0.392 | 2.090 | 1.996 | | - | | | 3.058 |
| | 11.00 | 0.405 | 2.064 | 1.970 | | - | | | 3.143 |
| | 11.65 | 0.440 | 1.995 | 1.901 | | - | | | 3.366 |
| 3-1/2 | 9.30 | 0.254 | 2.992 | 2.867 | 4.250 | 3.982 | 8.535 | 3.775 | 2.590 |
| | 10.30 | 0.289 | 2.922 | 2.797 | | 3.933 | | | 2.915 |
| | 12.80 | 0.368 | 2.764 | 2.639 | | 4.051 | | | 3.621 |
| | 12.95 | 0.375 | 2.750 | 2.625 | | 4.059 | | | 3.682 |
| | 15.10 | 0.449 | 2.602 | 2.477 | | - | | | 4.304 |
| | 15.90 | 0.476 | 2.548 | 2.423 | | - | | | 4.522 |
| | 16.70 | 0.510 | 2.480 | 2.355 | | - | | | 4.791 |
| | 17.05 | 0.530 | 2.440 | 2.315 | | - | | | 4.945 |
| 4 | 11.00 | 0.262 | 3.476 | 3.351 | 4.750 | 4.402 | 9.118 | 4.056 | 3.077 |
| | 13.40 | 0.330 | 3.340 | 3.215 | | 4.492 | | | 3.805 |
| | 19.00 | 0.500 | 3.000 | 2.875 | | - | | | 5.498 |
| | 22.50 | 0.610 | 2.780 | 2.655 | | - | | | 6.497 |
| 4-1/2 | 12.75 | 0.271 | 3.958 | 3.833 | 5.200 | 4.921 | 9.398 | 4.306 | 3.600 |
| | 13.50 | 0.290 | 3.920 | 3.795 | | 4.921 | | | 3.836 |
| | 15.50 | 0.337 | 3.826 | 3.701 | | 4.996 | | | 4.407 |
| | 19.20 | 0.430 | 3.640 | 3.515 | | - | | | 5.498 |
| | 21.60 | 0.500 | 3.500 | 3.375 | | - | | | 6.283 |
| | 24.00 | 0.560 | 3.380 | 3.255 | | - | | | 6.932 |
| | 26.50 | 0.630 | 3.240 | 3.115 | | - | | | 7.660 |





| (B) Coupling Critical Area (Sq. in) | | Coupling Efficiency (%) B/A x 100 | | Joint Yield Strength (1,000 lbs) | | | | | | | | | |
|--|---------|---|---------|----------------------------------|------|---|-------------|------------------------------|------|---|---|--------------------|-----------------------------------|
| | | | | J55 | C75 | N80 L80 AC80 CR9,13,25 -80 NIC25,32 -80 | C90 AC90 | C95 AC95 CR9,13 -95 | P105 | NIC 25 32 42 -110 CR22 -110 | NK125 NIC 25 32 42 42M 52 -125 CR22 -125 | NIC 42M -135 | NIC 52 -140 CR22 -140 |
| Regular | Special | Regular | Special | | | | | | | | | | |
| 2.365 | 1.603 | 181 | 123 | 72 | 98 | 104 | 117 | 124 | 137 | 143 | 163 | 176 | 183 |
| | 1.603 | 160 | 109 | 81 | 111 | 118 | 133 | 140 | 155 | 162 | 185 | 199 | 207 |
| | 1.740 | 140 | 103 | 93 | 127 | 135 | 152 | 161 | 178 | 186 | 212 | 228 | 237 |
| | 1.791 | 136 | 103 | 95 | 130 | 139 | 156 | 165 | 182 | 191 | 217 | 234 | 243 |
| | - | 110 | - | 119 | 162 | 172 | 194 | 204 | 226 | 237 | 269 | 291 | 301 |
| 3.503 | 2.025 | 193 | 112 | 100 | 136 | 145 | 163 | 172 | 190 | 199 | 227 | 245 | 254 |
| | 2.332 | 155 | 103 | 124 | 169 | 180 | 203 | 214 | 237 | 248 | 282 | 304 | 316 |
| | 2.555 | 141 | 103 | 137 | 186 | 199 | 224 | 236 | 261 | 273 | 311 | 335 | 348 |
| | 2.781 | 129 | 103 | 149 | 203 | 217 | 244 | 257 | 285 | 298 | 339 | 366 | 379 |
| | - | 114 | - | 168 | 230 | 245 | 275 | 291 | 321 | 336 | 382 | 413 | 428 |
| | - | 111 | - | 173 | 236 | 252 | 283 | 299 | 330 | 346 | 393 | 424 | 440 |
| | - | 104 | - | 185 | 252 | 269 | 303 | 320 | 353 | 370 | 421 | 454 | 471 |
| 5.045 | 2.682 | 195 | 104 | 142 | 194 | 207 | 233 | 246 | 272 | 285 | 324 | 350 | 363 |
| | 2.995 | 173 | 103 | 160 | 219 | 233 | 262 | 277 | 306 | 321 | 364 | 394 | 408 |
| | 3.735 | 139 | 103 | 199 | 272 | 290 | 326 | 344 | 380 | 398 | 453 | 489 | 507 |
| | 3.786 | 137 | 103 | 203 | 276 | 295 | 331 | 350 | 387 | 405 | 460 | 497 | 515 |
| | - | 117 | - | 237 | 323 | 344 | 387 | 409 | 452 | 473 | 538 | 581 | 603 |
| | - | 112 | - | 249 | 339 | 362 | 407 | 430 | 475 | 497 | 565 | 610 | 633 |
| | - | 105 | - | 264 | 359 | 383 | 431 | 455 | 503 | 527 | 599 | 647 | 671 |
| | - | 102 | - | 272 | 371 | 396 | 445 | 470 | 519 | 544 | 618 | 668 | 692 |
| 5.808 | 3.292 | 189 | 107 | 169 | 231 | 246 | 277 | 292 | 323 | 338 | 385 | 415 | 431 |
| | 3.920 | 153 | 103 | 209 | 285 | 304 | 342 | 361 | 400 | 419 | 476 | 514 | 533 |
| | - | 106 | - | 302 | 412 | 440 | 495 | 522 | 577 | 605 | 687 | 742 | 770 |
| | - | 89 | - | 319C | 436C | 465C | 523C | 552C | 610C | 639C | 726C | 784C | 813C |
| 6.171 | 3.954 | 171 | 110 | 198 | 270 | 288 | 324 | 342 | 378 | 396 | 450 | 486 | 504 |
| | - | 161 | 103 | 211 | 288 | 307 | 345 | 364 | 403 | 422 | 480 | 518 | 537 |
| | 4.529 | 140 | 103 | 242 | 331 | 353 | 397 | 419 | 463 | 485 | 551 | 595 | 617 |
| | - | 112 | - | 302 | 412 | 440 | 495 | 522 | 577 | 605 | 687 | 742 | 770 |
| | - | 98 | - | 339C | 463C | 494C | 555C | 586C | 648C | 679C | 771C | 833C | 864C |
| | - | 89 | - | 339C | 463C | 494C | 555C | 586C | 648C | 679C | 771C | 833C | 864C |
| 6.171 | - | 81 | - | 339C | 463C | 494C | 555C | 586C | 648C | 679C | 771C | 833C | 864C |

Note: C Critical Member is Coupling Side.

EXHIBIT L-5
INJECTION PACKER DATA



RETRIEVABLE PACKER SYSTEMS

MODEL "R-3"™ DOUBLE-GRIP RETRIEVABLE CASING PACKER Product No. 642-01

The "R-3 Double-Grip" is a truly versatile set-down type packer. Proven by its world-wide use, it performs reliably in production, stimulation and testing operations.

FEATURES/BENEFITS

- Hydraulic button-type hold down located below the bypass valve.
- Unique, built-in, "differential lock" helps keep the bypass valve closed.
- Effective bypass design speeds equalization and resists swab-off.
- Field-proven, three-element packing system and rocker-type slips.

MODEL "R-3" SINGLE-GRIP RETRIEVABLE CASING PACKER Product No. 641-01

In wells where excessive bottom-hole pressure is not expected, the "Single-Grip R-3" is the answer to your needs for a set-down, retrievable packer. From the packing elements down, the "R-3 Single-Grip" is identical to the Double-Grip Model. Running, setting and releasing procedures are the same for both packers.

TO SET THE PACKER: The "R-3" is set by picking up, rotating to the right and then slacking off on the tubing. Set-down weight closes and seals the bypass valve, sets the slips and packs-off the packing elements.

TO RELEASE THE PACKER: Picking up the tubing releases the packer (no rotation required). When the tubing is raised, the bypass valve opens to permit circulation through and around the packer. When the tubing string is raised the full length of the packer, the J-pins (on the bottom sub) are oriented for automatic re-engagement. By then lowering the tubing slightly, the J-pin engages the J-slot thus assuring complete release and preventing accidental resetting while retrieving the packer.

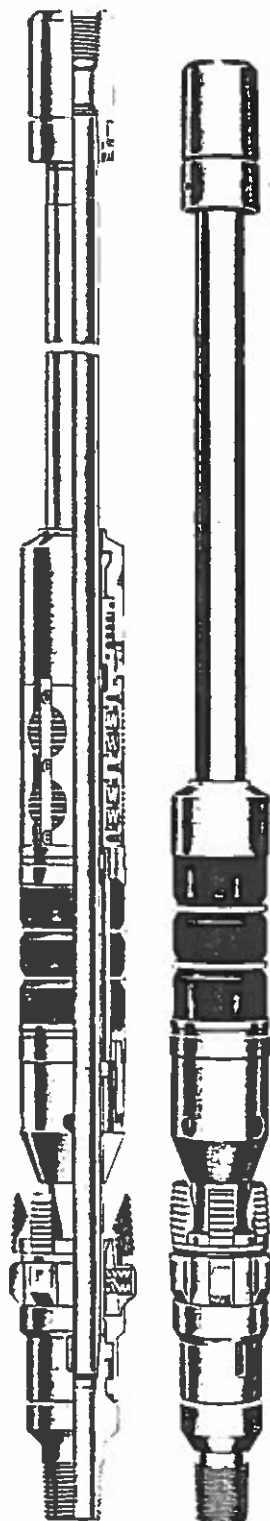
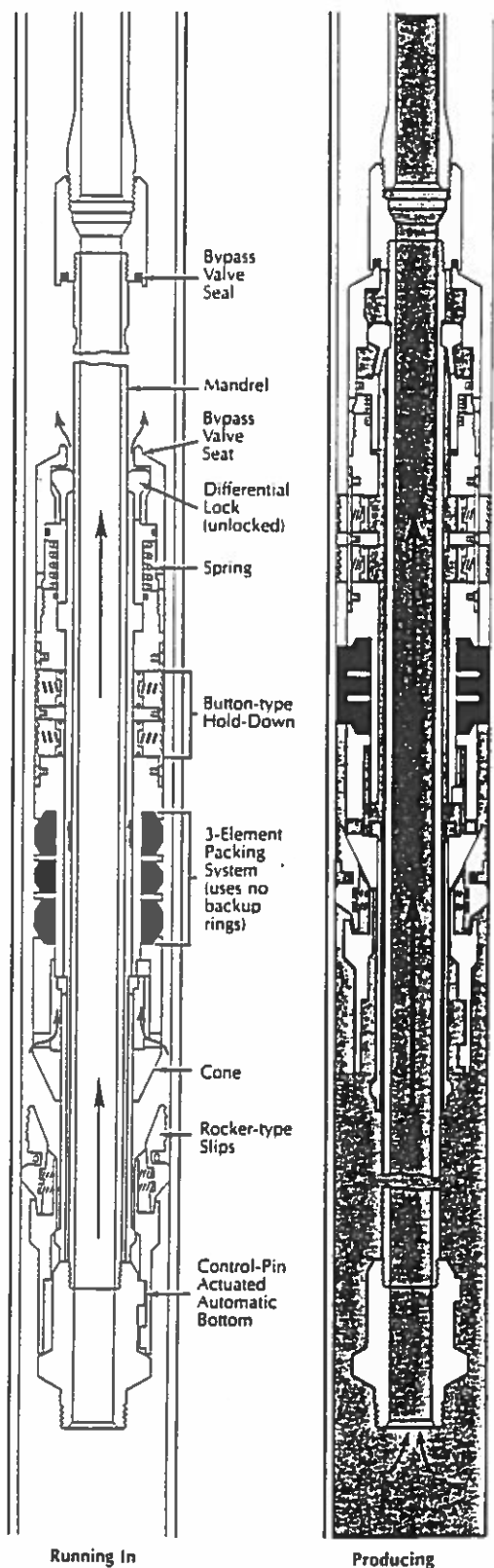
ORDERING EXAMPLE:

PRODUCT NO. 642-01

SIZE: 4784 (7" OD 20-26 lb/ft casing)

MODEL "R-3" DOUBLE-GRIP RETRIEVABLE CASING PACKER
w/2-7/8" OD EU B RD Box x Pin, for J-53, 6.5 lb/ft tubing

MODEL "R-3" DOUBLE-GRIP PACKER OPERATION



Model "R-3" Double-Grip, (left)
and Single-Grip (right)
Retrievable Casing Packers

MODEL "R-3" DOUBLE-GRIP AND SINGLE-GRIP RETRIEVABLE CASING PACKER PROD. NOS. 642-01, 641-01 SPECIFICATION GUIDE

RETRIEVABLE PACKER SYSTEMS



| Casing | | | | Packer | | | | Casing | | | | Packer | | | |
|--------------|---------------------|-------------------------------------|-------|---|-------------------|--------|----------------------|---------------------|-------------------------------------|-------|---|-------------------|--------|----------------------|--|
| OD | Weight ¹ | ID Range in Which Packer May Be Run | | Thread Specification ² Box Up & Pin Down | Size ³ | Nom ID | Gage & Guide Ring OD | Weight ¹ | ID Range in Which Packer May Be Run | | Thread Specification ² Box Up & Pin Down | Size ³ | Nom ID | Gage & Guide Ring OD | |
| | | Min | Max | | | | | | Min | Max | | | | | |
| 2-7/8 73.02 | 6.4-6.5 | 2.347 | 2.441 | 20A | | .75 | 2.330 | 24-28 | 5.791 | 5.921 | 45EF | | 1.96 | 5.484 | |
| | | 59.62 | 62.00 | 20A ¹ | | 19.05 | 59.18 | | 147.1 | 150.4 | 46A4 | | 49.78 | 139.29 | |
| | | | | Hi Temp | | | | | | | | | | 141.94 | |
| 4-7-5.6 | 2.442 | 2.563 | 2.882 | 28B | | | 2.357 | 24 | 5.830 | 5.937 | 47A2 | 2.41 | 2.41 | 5.656 | |
| | | 62.03 | 65.10 | | | | 59.87 | | 148.1 | 150.8 | | 61.21 | 61.21 | 143.66 | |
| | | | | | | | | | 5.938 | 6.135 | 47A4 | | | 5.812 | |
| 3-1/2 86.90 | 10.2 | 2.834 | 2.922 | 35A | | | 2.782 | 17-28 | 5.989 | 6.094 | 47A4 x 3 | 3.00 | 3.00 | 147.62 | |
| | | 71.98 | 74.22 | | | | 70.66 | | 152.1 | 154.8 | | 76.20 | 76.20 | 147.62 | |
| | | | | 35B | | 35.05 | 72.24 | | 6.135 | 6.276 | | | | 151.59 | |
| | | | | 35C | | | 77.17 | | 155.8 | 159.4 | 47B2 x 3 | | | 151.59 | |
| 4 101.60 | 9.5-11.6 | 3.428 | 3.548 | 41A | | 1.50 | 3.303 | 38 | 5.791 | 5.921 | 46A4 | | | 5.588 | |
| | | 87.97 | 90.12 | | | | 83.99 | | 147.1 | 150.4 | | | | 141.94 | |
| 4-1/2 114.30 | 15.1 | 3.754 | 3.876 | 41B | | 35.10 | 3.620 | 32-35 | 5.830 | 5.937 | 47A2 | 2.41 | 2.41 | 5.656 | |
| | | 95.35 | 97.18 | | | | 91.95 | | 148.1 | 150.8 | | 61.21 | 61.21 | 143.66 | |
| | | | | 43A | | | 3.771 | | 5.922 | 6.135 | 46B | | | 5.781 | |
| | | | | | | | 95.78 | | 150.4 | 155.8 | | | | 146.84 | |
| 5 127.00 | 15-18 | 4.250 | 4.408 | 43B | | 1.89 | 4.125 | | 5.938 | 155.8 | 47A4 | | | 5.812 | |
| | | 107.9 | 112.0 | | | 48.01 | 104.78 | | 150.8 | | | | | 147.62 | |
| | | | | 43C | | | 4.250 | | 5.989 | 6.094 | 47A4 x 3 | 3.00 | 3.00 | 151.59 | |
| | | | | | | | 107.95 | | 152.1 | 154.8 | | | | 151.59 | |
| 5-1/2 139.70 | 20-23 | 4.625 | 4.777 | 45A2 | | 1.94 | 4.500 | 26-28 | 6.135 | 6.276 | 47B2 | 2.41 | 2.41 | 5.968 | |
| | | 117.5 | 121.3 | 45A2 x 2-3/8 | | 47.78 | 114.38 | | 155.8 | 159.4 | | | | 151.59 | |
| | | | | | | 60.45 | | | 158.8 | | | | | 151.59 | |
| | | | | | | | | | 158.8 | | | | | 151.59 | |
| | | | | | | | | | 158.8 | | | | | 151.59 | |
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| | | | | | | | | | 158.8 | | | | | 151.59 | |
| | | | | | | | | | 158.8 | | | | | 151.59 | |
| | | | | | | | | | 158.8 | | | | | 151.59 | |
| | | | | | | | | | 158.8 | | | | | 151.59 | |
| | | | | | | | | | 158.8 | | | | | 151.59 | |
| | | | | | | | | | 158.8 | | | | | 151.59 | |
| | | | | | | | | | 158.8 | | | | | 151.59 | |
| | | | | | | | | | 158.8 | | | | | 151.59 | |
| | | | | | | | | | 158.8 | | | | | 151.59 | |
| | | | | | | | | | 158.8 | | | | | 151.59 | |
| | | | | | | | | | 158.8 | | | | | 151.59 | |
| | | | | | | | | | 158.8 | | | </ | | | |

EXHIBIT L-6

**CASING CEMENTING JOB DATA AND
U.S. EPA INSPECTOR'S REPORTS
(CONDUCTOR PIPE, SURFACE CASING, LONG STRING AND LINER)**

CEMENTING TICKET

2478

ROBINSON ENGINEERING**Oilwell Cementing Division**

P.O. Box 5269, Evansville, Indiana 47716-5269

(812) 477-1575

Date 3-11-71 Field MORGANTOWN Order No. #1Well No. #1 Farm IMCO County BUTLER State KYTO: IMCO RECYCLING INC. Owner of Well IMCO

Mail Address _____

City MORGANTOWN State KENTUCKY Contractor IND DRILLDepth of Well 43' Depth of Casing 38' Casing { New } Size 1 5/8" Size of Hole 1 7/8"
{ Used } Weight _____Kind of Job CONCRETE Press: { Circulating _____ Cement left _____ Request _____
Maximum _____ in Pipe by _____ Necessity _____ Feet

| | Unit Price | Price |
|--|-------------------|--------------------|
| Pump Truck RIG UP | 350 ⁰⁰ | 350 ⁰⁰ |
| 80 mins @ 2.24/min | 2 ⁰⁰ | 176 ⁰⁰ |
| Cement 100 SK CLASS A | 5 ⁰⁰ | 500 ⁰⁰ |
| 700 SKS (100 SK) (44 1/2 SK) (200 SK) (200 SK) | .65 | 244 ⁰⁰ |
| Additives 2 SK Calcium Chloride | 25 ⁰⁰ | 50 ⁰⁰ |
| Plugs - NONE | | |
| Other CEMENT CALCULATED TO SURFACE. | | |
| TOTAL | | 1450 ⁰⁰ |

As a part of the consideration of, it is agreed that Oil Well Cementing shall not be liable or responsible for any loss, damage or injury to said well resulting from the use of such cementing equipment, or for the acts of any person engaged in doing such work on the above described well. The above job was done under the supervision of the owner, operator, or his agent whose signature appears below:

Cementer BARRY SCHROEDER

Agent of Contractor or Operator

Helper DUANE KIRKLEY

ROGER WATSON
Signature
ROGER WATSON
Print Name

CEMENTING TICKET

2477

ROBINSON ENGINEERING

Oilwell Cementing Division

P.O. Box 5269, Evansville, Indiana 47716-5269

(812) 477-1575

Date 8-12-91 Field MORGANTOWN Order No. #2
 Well No. #1 Farm IMCO County BUTLER State KY
 CHARGE TO: IMCO RECYCLING Owner of Well IMCO
 Mail Address _____
 City MORGANTOWN State KENTUCKY Contractor IND DILL

Depth of Well 470' Depth of Casing 465' Casing { New } Size 7 1/2 Size of Hole 10 1/4
 { Used } Weight 36 LB/FT
 Kind of Job SURFACE Press: { Circulating _____ Cement left _____ Request _____
 { Maximum _____ in Pipe by _____ Necessity 20' Feet

| | Unit Price | Price |
|--|-------------------|--------------------|
| Pump Truck <u>KICK UP</u> | 350 ⁰⁰ | 350 ⁰⁰ |
| <u>20 miles @ 22X mile</u> | 2 ²⁴ | 176 ⁰⁰ |
| Cement <u>300 SK CLASS A</u> | 5 ⁰⁰ | 1500 ⁰⁰ |
| <u>200 miles (300 SK) (44 1/2 SK) (1100 X 80.00)</u> | 1.25 | 733 ⁰⁰ |
| Additives <u>6 SK CALCIUM CHLORIDE</u> | 25 ⁰⁰ | 150 ⁰⁰ |
| Plugs <u>- NONE</u> | | |
| Other <u>3.95A CENTRIFUGALS</u> | 64 ⁰⁰ | 192 ⁰⁰ |
| <u>CEMENT CIRCULATED TO THE SURFACE</u> | | |
| TOTAL | | 3057 ⁰⁰ |

As a part of the consideration of, it is agreed that Oil Well Cementing shall not be liable or responsible for any loss, damage or injury to said well resulting from the use of such cementing equipment, or for the acts of any person engaged in doing such work on the above described well. The above job was done under the supervision of the owner, operator, or his agent whose signature appears below:

Cementer BARRY SCHEDEEN Agent of Contractor or Operator I. C. T. T.
 Helper QUINCE KIRBY Signature _____
 Print Name _____



McCoy & McCoy ENVIRONMENTAL CONSULTANTS, INC.
A SUBSIDIARY OF MCCOY & MCCOY, INC.

UIC MECHANICAL INTEGRITY TEST



Region IV Water Supply Branch
345 Courtland St. NE
Atlanta, Georgia 30385
Phone (404)347-3866

WELL IDENTIFICATION

| | |
|---|--|
| OPERATOR <u>IMCO Recycling, Inc.</u> | EPA KYS NO. <u>KYI 0429</u> |
| ADDRESS <u>1503-1511 North 8TH St.</u> | LEASE NAME <u>IMCO Well #1</u> |
| <u>Sapulpa, OK 74066</u> | WELL NO. <u>IMCO Well #1</u> |
| PHONE # <u>(918)</u> | STATE PERMIT NO. <u>81179</u> POOL _____ |
| 2340 <u>PS</u> : <u>160</u> <u>FEI</u> : <u>14</u> <u>I</u> : <u>34</u> | STATE NAME/CODE <u>KY/21</u> TN/47 (circle one) |
| | COUNTY NAME <u>Butler</u> COUNTY CODE <u>031</u> |

WELL COMPLETION

| | | |
|---------------------------|---|---|
| WELL TYPE (code) <u>I</u> | TOTAL DEPTH _____ (ft) | SURFACE ELEVATION <u>445.6</u> (ft MSL) |
| CASING STRING | CASING DIAMETER (inches) <u>9 5/8"</u> | CEMENT SHOE DEPTH <u>466</u> |
| Surface | CEMENT VOLUME (sacks/type) <u>300 sks</u> | PACKER TYPE _____ |
| Intermediate | | PACKER DEPTH _____ (ft) |
| Production | | MAX. INJECTING PRES. _____ (psi) |
| Tubing | | EST. FRACTURE PRES. _____ (psi) |
| | | PERFORATIONS @ _____ (ft) |
| CONFINING FORMATION | NAME _____ | LOWERMOST USDW |
| | TOP ELEVATION _____ (MSL) | FORMATION NAME _____ |
| | THICKNESS _____ (ft) | BASE ELEVATION _____ (MSL) |
| | | INJECTION FORMATION |
| | | FORMATION NAME _____ |
| | | TOP ELEVATION _____ (MSL) |

MIT TEST DATA

| | |
|---|--------------------------------|
| TEST DATE <u>8/12/91</u> | INJECTED FLUID _____ Sg _____ |
| EXTERNAL MIT CEMENT RECORD <input type="checkbox"/> | ANNULAR FLUID _____ Sg _____ |
| LOGS <input type="checkbox"/> | INJECTION RATE _____ (bbl/day) |
| TYPE OF TEST | INJECTION PRESSURE _____ (psi) |
| SHUT-IN <input type="checkbox"/> | |
| INJECTING <input type="checkbox"/> (check one) | |

ANNULAR PRESSURE TEST

| | | | |
|-----------------------------------|---------------------------------|---------------------------------|--------------------------------|
| INITIAL TEST PRESSURE (psi) _____ | FINAL TEST PRESSURE (psi) _____ | PRESSURE CHANGE (+/- psi) _____ | LENGTH OF TEST (MINUTES) _____ |
| ANNULAR SPACE _____ | | | |

COMMENTS

NEW WELL CONSTRUCTION.

Witness cementing of surface casing only

9 5/8" TOC @ surface.

Work done by Robinson Engineering

OPERATOR REPRESENTATIVE Erwin Turner UIC INSPECTOR David M. Oldham

U.S. ENVIRONMENTAL PROTECTION AGENCY

Notice of Inspection

| | | | |
|--|---|--|---|
| ADDRESS (EPA Regional Office) Environmental Protection Agency Region IV, Ground Water Protection Branch 345 Courtland St. NE Atlanta, Georgia 30385 404-347-3866 | | INSPECTION CONTRACTOR McCoy & McCoy, Inc. P.O. Box 11279 Lexington, Kentucky 40574 606-233-7774 | FIRM TO BE INSPECTED IMCO Recycling, Inc. 1503-1511 North 8th St. Sapulpa, OK 74066 |
| DATE 8/12/91 | This document constitutes written notice pursuant to 42 U.S.C. § 300j-4 (b)(1) of inspection by duly authorized personnel of the U.S. Environmental Protection Agency of this facility noted below. | | |
| HOUR | | | |

REASON FOR INSPECTION *New Well Construction*

The purpose of inspection is to determine whether the person (including any corporation or partnership) subject to any applicable underground injection control program has acted or is acting in compliance with The Safe Drinking Water Act and all regulations promulgated thereunder, including underground injection control (UIC) regulations and any applicable permit or rule.

IMCO well #1 KYI0429

Ran 471' of 9⁵/₈" casing, 36 lbs/ft., to 466' below ground level and circulated 300 sks A' cement w/ 4% CaCl followed by 34 bbls water.

Section 1445(b) of the SDWA (42 U.S.C. § 300j-4 (b)) is quoted on the reverse of this form.

Receipt of this Notice of Inspection is hereby acknowledged.

| | | |
|---|-------------------------------|---|
| FIRM REPRESENTATIVE <i>D. L. Turner</i> | DATE <i>8/12/91</i> | INSPECTOR (McCoy & McCoy) <i>David M. O'Brien</i> |
|---|-------------------------------|---|

CS-496 PRINTED IN U.S.A.



| | | |
|------------------|--------------|------|
| TREATMENT NUMBER | | DATE |
| STAGE | OS. DISTRICT | |

| | | | | | |
|---|--|------------------------------------|--|----------------------------|--|
| WELL NAME AND NO. <i>1100-1111-1</i> | | LOCATION (LEGAL) <i>Madison</i> | | RIG NAME <i>Madison</i> | |
| FIELD POOL | | FORMATION <i>Madison</i> | | WELL DATA BOTTOM TOP | |
| Y/PARISH <i>Madison</i> | | STATE <i>Kentucky</i> | | API NO. | |
| NAME <i>1100-1111-1</i> | | MUD DENSITY | | MUD VISC. | |
| AND <i>1100-1111-1</i> | | MUD TYPE | | MUD VISC. | |
| ADDRESS <i>1100-1111-1</i> | | MUD TYPE | | MUD VISC. | |
| ZIP CODE | | MUD TYPE | | MUD VISC. | |
| SPECIAL INSTRUCTIONS | | MUD TYPE | | MUD VISC. | |
| IS CASING TUBING SECURED? YES NO | | MUD TYPE | | MUD VISC. | |
| LIFT PRESSURE PSI | | MUD TYPE | | MUD VISC. | |
| PRESSURE LIMIT PSI | | MUD TYPE | | MUD VISC. | |
| ROTATE RPM | | MUD TYPE | | MUD VISC. | |
| RECIPROCAT FT | | MUD TYPE | | MUD VISC. | |
| No of Centralizers | | MUD TYPE | | MUD VISC. | |
| HEAD & PLUGS | | MUD TYPE | | MUD VISC. | |
| Double | | MUD TYPE | | MUD VISC. | |
| Single | | MUD TYPE | | MUD VISC. | |
| Swage | | MUD TYPE | | MUD VISC. | |
| Knockoff | | MUD TYPE | | MUD VISC. | |
| TOP OR CW | | MUD TYPE | | MUD VISC. | |
| BOT OR CW | | MUD TYPE | | MUD VISC. | |
| TUBING VOLUME | | MUD TYPE | | MUD VISC. | |
| CASING VOL. BELOW TOOL | | MUD TYPE | | MUD VISC. | |
| TOTAL | | MUD TYPE | | MUD VISC. | |
| ANNUAL VOLUME | | MUD TYPE | | MUD VISC. | |

[illegible]

REMARKS

| SYSTEM CODE | NO. OF SACKS | YIELD CU FT/SK | COMPOSITION OF CEMENTING SYSTEMS | SLURRY MIXED | |
|-------------|--------------|----------------|---|--------------|---------|
| | | | | BBLs | DENSITY |
| 1 | 450 | 1.4 | 1 lb. 1/2 + 27/100 753 + 30 201 (24102) + 0.5% 7127 | 98 | 14.8 |
| 2 | | | + 0.2% 746 + 54/100 747 + 1/10 729 | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |

| | | | | | | | |
|----------------------|---|-------------|------------------|---|---------------------------|---|--------------------------------|
| BREAKDOWN FLUID TYPE | | VOLUME | | DENSITY | PRESSURE | MAX 1300 | MIN 0 |
| STATION SO | | RUNNING SO. | CIRCULATION LOST | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | Cement Circulated To Surf | <input checked="" type="checkbox"/> YES | <input type="checkbox"/> NO 25 |
| BREAKDOWN | PSI | FINAL | PSI | DISPLACEMENT VOL. 99 | Bbls | | |
| Washed Thru Peris | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | TO | FT | MEASURED DISPLACEMENT 1 | 5-18 | <input type="checkbox"/> WIRELINE | |
| PERFORATIONS | | | | CUSTOMER REPRESENTATIVE | | DS SUPERVISOR | |
| TO TO | | | | TO TO | | | |

DOVELL SCHLUMBERGER INCORPORATED P.O. BOX 4378 HOUSTON, TEXAS 77210

OILFIELD SERVICES ☒
 INDUSTRIAL SERVICES ☐

DSI SERVICE ORDER
 RECEIPT AND INVOICE NO.

DSI SERVICE LOCATION NAME AND NUMBER

0103-6901

CUSTOMER NUMBER

CUSTOMER P.O. NUMBER

TYPE SERVICE CODE

BUSINESS CODES

CUSTOMER'S NAME

ADDRESS

CITY STATE AND ZIP CODE

IMCO Aluminum
 P.O. BOX 1010
 Morgantown, KY 42251

WORKOVER ☐
 NEW WELL ☐
 OTHER ☐

W ☐
 N ☐

API OR IC NUMBER

SEE OTHER SIDE FOR TERMS & CONDITIONS

ARRIVE LOCATION MO. DAY YR. TIME
 8 21 91 223

SERVICE ORDER RECEIPT

I certify that the materials and services listed were authorized and received and all services performed in a workmanlike manner and that I have the authority to accept and execute this document.

JOB COMPLETION MO. DAY YR. TIME
 8 22 91 0136

SIGNATURE OF CUSTOMER OR AUTHORIZED REPRESENTATIVE

STATE CODE COUNTY / PARISH

CODE CITY

Kentucky

Butler

Morgantown

WELL NAME AND NUMBER / JOB SITE

LOCATION AND POOL / PLANT ADDRESS

SHIPPED VIA

IMCO Aluminum #1

IMCO Production

US Units

| ITEM PRICE REF. NO. | MATERIAL, EQUIPMENT AND SERVICES USED | UNIT | QUANTITY | UNIT PRICE | \$ AMOUNT |
|---------------------|---------------------------------------|--------|----------|------------|-----------|
| 059200 - 002 | Mining or pump unit | Mi | 90 | 2.55 | 238.50 |
| 102971 - 025 | Pump Unit | ea | 1 | 1055.00 | 1055.00 |
| 049103 - 000 | Service Charge | hrs | 512 | 1.15 | 588.80 |
| 044102 - 000 | Hauling | Ton-mi | 2103 | 0.80 | 1682.40 |
| 059597 - 000 | PAC T-Marker / Recorder | ea | 1 | 125.00 | 125.00 |
| 05301 - 300 | Cement Head | ea | 1 | 60.00 | N/C |
| 058702 - 070 | 7" Top plug | ea | 1 | 70.00 | 70.00 |
| 053011 - 070 | 7" Centralizer | ea | 15 | 85.00 | 975.00 |
| 053015 - 070 | 7" Baffle Plate | ea | 1 | 63.00 | 63.00 |
| 053008 - 070 | 7" Cement Basket | ea | 3 | 175.00 | 525.00 |
| 053021 - 070 | 7" Pack-off Shoe | ea | 1 | 2340.00 | 2340.00 |
| 040001 - 000 | D901, Class A Cement | SK | 450 | 5.75 | 2587.50 |
| 040020 - 050 | D53, Cementing agent | lb | 900 | 0.33 | 297.00 |
| 007011 - 000 | M117, Potassium Chloride | lb | 660 | 0.25 | 165.00 |
| 101036 - 050 | D127, Fluid loss agent | lb | 250 | 6.00 | 1500.00 |
| 047002 - 050 | D46, Anti-foam agent | lb | 84 | 2.85 | 239.40 |
| 045019 - 050 | D42, Kelite | lb | 2200 | 0.41 | 902.00 |
| 044003 - 025 | D29, Cellulose Flake | lb | 112 | 1.45 | 162.40 |
| 040243 - 000 | Chemical Wash | gal | 10 | 33.25 | 332.50 |
| 060005 - 100 | Si, Calcium Chloride | lb | 300 | 0.34 | 102.00 |
| 000632 - 000 | Zonolock | gal | 420 | 2.30 | 966.00 |
| 100292 - 000 | CWT, Chemical Wash | BTU | 10 | 24.90 | 249.00 |

Thank You For Using Dowell Schlumberger!

SUB TOTAL

Field Estimate \$ 15,333.00

LICENSE/REIMBURSEMENT FEE

LICENSE/REIMBURSEMENT FEE

STATE

% TAX ON \$

COUNTY

% TAX ON \$

CITY

% TAX ON \$

SIGNATURE OF DSI REPRESENTATIVE

TOTAL \$

Benny K. Dean



COY & MCCOY ENVIRONMENTAL CONSULTANTS, INC.
A SUBSIDIARY OF MCCOY & MCCOY, INC.

UIC MECHANICAL INTEGRITY TEST



Region IV Water Supply Branch
345 Courtland St. NE
Atlanta, Georgia 30385
Phone (404)347-3868

WELL IDENTIFICATION

OPERATOR IMCO Recycling, Inc.

EPA KYS NO. KYI0429

ADDRESS 1503-1511 North 8th St.
Sapulpa, OK 74066

LEASE NAME
WELL NO. IMCO Well #1

PHONE # (918) 665-6575

STATE PERMIT NO. 31179 POOL _____

STATE NAME/CODE (KY)21 TN/47 (circle one)

COUNTY
NAME Butler

COUNTY
CODE 031

2340 FSL 160 PEL 14 I 34 EXL

WELL COMPLETION

WELL TYPE (code) I

TOTAL DEPTH 3998 (ft)

SURFACE ELEVATION 445.6 (ft MSL)

CASING
STRING

CASING
DIAMETER
(inches)

CEMENT
SHOE
DEPTH

CEMENT
VOLUME
(sacks/type)

PACKER TYPE _____
PACKER DEPTH _____ (ft)

Surface
Intermediate
Production
Tubing

9 5/8"
7"

466
2542

300 sks / A'
450 sks / A'

MAX. INJECTING PRES. _____ (psi)
EST. FRACTURE PRES. _____ (psi)
PERFORATIONS @ _____ (ft)

CONFINING
FORMATION

NAME _____

TOP ELEVATION _____ (MSL)

THICKNESS _____ (ft)

LOWERMOST
USDW

FORMATION NAME _____

BASE ELEVATION _____ (MSL)

INJECTION
FORMATION

FORMATION NAME _____

TOP ELEVATION _____ (MSL)

MIT TEST DATA

TEST DATE 8/21/91

INJECTED FLUID _____ Sg _____

EXTERNAL MIT- CEMENT RECORD ☐

LOGS ☐

ANNULAR FLUID _____ Sg _____

TYPE OF TEST

SHUT-IN ☐
INJECTING ☐

(check one)

INJECTION RATE _____ (bbl/day)

INJECTION PRESSURE _____ (psi)

ANNULAR PRESSURE TEST

INITIAL TEST PRESSURE
(psi)

FINAL TEST PRESSURE
(psi)

PRESSURE CHANGE
(+/- psi)

LENGTH OF TEST
(MINUTES)

ANNULAR SPACE _____

COMMENTS

New Well Construction. Witness cementing of 7" long string
7" casing: K55, 23 lbs/ft @ 9.55/ft, = 45' joints, bottom 7 joints were
sandblasted, 3 cement baskets on end, 15 centralizers.

Cement work by Dowell-Schlumberger out of Mt Carmi, IL. Slurry: 14.8 lbs/g
7" cement circulated to surface w/ 450 sks followed by 99 bbls
water.

OPERATOR
REPRESENTATIVE

Irfan Tamm

UIC INSPECTOR

David M. Odham

U.S. ENVIRONMENTAL PROTECTION AGENCY

Notice of Inspection

ADDRESS (EPA Regional Office)

Environmental Protection Agency
Region IV, Ground Water Protection Branch
345 Courtland St. NE
Atlanta, Georgia 30365
404-347-3866

INSPECTION CONTRACTOR

McCoy & McCoy, Inc.
P.O. Box 11279
Lexington, Kentucky 40574
606-233-7774

FIRM TO BE INSPECTED

IMCO Recycling, Inc.

DATE *8/21/91*

HOUR *1:30 am* ^{*8/22/91*}

This document constitutes written notice pursuant to 42 U.S.C. § 300j-4 (b)(1) of inspection by duly authorized personnel of the U.S. Environmental Protection Agency of this facility noted below.

REASON FOR INSPECTION

The purpose of inspection is to determine whether the person (including any corporation or partnership) subject to any applicable underground injection control program has acted or is acting in compliance with The Safe Drinking Water Act and all regulations promulgated thereunder, including underground injection control (UIC) regulations and any applicable permit or rule.

IMCO Well #1 KYI 0429

Ran 7" to 2542' (base of shale), circulated 450 sks to surface

Section 1445(b) of the SDWA (42 U.S.C. § 300j-4 (b)) is quoted on the reverse of this form.

Receipt of this Notice of Inspection is hereby acknowledged.

FIRM REPRESENTATIVE

Infum Tsun

DATE

8/21/91

INSPECTOR

(McCoy & McCoy)

David M. O'Brien

DOWELL SCHLUMBERGER INCORPORATED

P.O. BOX 4378 HOUSTON, TEXAS 77210

OILFIELD SERVICES
INDUSTRIAL SERVICES

DSI SERVICE ORDER
RECEIPT AND INVOICE NO.

DSI SERVICE LOCATION NAME AND NUMBER

03-7030

CUSTOMER NUMBER

CUSTOMER P.O. NUMBER

TYPE SERVICE CODE

BUSINESS CODES

CUSTOMER'S
NAME

ADDRESS

CITY, STATE AND
ZIP CODE

WORKOVER
NEW WELL
OTHER

☐ W
☐ N

API OR IC NUMBER

IMPORTANT
SEE OTHER SIDE FOR TERMS & CONDITIONS

ARRIVE LOCATION MO. DAY YR. TIME
11 25 91 0800

SERVICE ORDER RECEIPT

I certify that the materials and services listed were authorized and received and all services performed in a workmanlike manner and that I have the authority to accept and execute this document.

JOB COMPLETION MO. DAY YR. TIME
11 27 91 0500

SIGNATURE OF CUSTOMER OR AUTHORIZED REPRESENTATIVE

STATE CODE COUNTY / PARISH CODE CITY

WELL NAME AND NUMBER / JOB SITE

LOCATION AND POOL / PLANT ADDRESS

SHIPPED VIA

| ITEM/PRICE REF. NO. | MATERIAL EQUIPMENT AND SERVICES USED | UNIT | QUANTITY | UNIT PRICE | \$ AMOUNT |
|--|---|-----------------|----------------|--------------------------|-------------------------------|
| 059200-002 102872-050 | Mineage Pump 2 | 2 1000 | 90 1 | 2.65 1400.00 | 238.50 1400.00 |
| 259697-000 7100-000 | Pack Service Charge | 22 CF | 1 667 | 135.00 1.15 | 135.00 767.05 |
| 049102-000 040001-000 | HAULING 64,038 - 9000 TML D901 CLASS A | CF CF | 2882 650 | 84.75 5.75 | 2,420.78 3,737.50 |
| 045022-050 057011-000 | D-53 ML-117 | 105 105 | 1300 1100 | 33 26 | 429.00 286.00 |
| 101036-050 047002-050 | D-127 D-46 | 105 105 | 364 122 | 6.00 2.87 | 2,184.00 350.14 |
| 100383-000 000632-000 | CW-100 30001000 D814 | 321 Cm1 | 10 420 | 33.25 2.30 | 332.50 966.00 |
| 056031-044 045023-050 056021-044 | 4 1/2 Controllers D-13 4 1/2 Pack off shoe | EA 105 EA | 22 122 1 | 50.00 1.22 1095.00 | 1100.00 146.90 1,095.00 |
| 048019-000 045030-000 | Additional DR Bulm. Tr. 21007 Additional DR Pump | DR DR | 40 50 | 47.50 125.00 | 1,900.00 3,700.00 |

SUB TOTAL

Final Est. 22,077.97

LICENSE / REIMBURSEMENT FEE

LICENSE / REIMBURSEMENT FEE

STATE

% TAX ON \$

COUNTY

% TAX ON \$

CITY

% TAX ON \$

SIGNATURE OF DSI REPRESENTATIVE

TOTAL \$

Corell P. Scammon



CemCADE TM Version 2.501
Well Cementing Recommendation

Client : IMCO ALUMINUM
Casing : 4 1/2 LINER
Well : DISPOSAL WELL
Field : MORGANTOWN
County : BUTLER
State : KENTUCKY
Rig Name : INDIANA DRILL

WELL Description

Job Type : Primary
Rig Type : OnShore
Fluid Returns at : 0.0 ft
Surface Temperature : 32.0 deg.F
Landing Collar MD : 4700.0 ft
Casing Shoe MD : 4700.0 ft
BHST : 100.0 deg.F
Bit Size : 7 in

| PREVIOUS CASING | | | |
|-----------------|------------|-------------------|------------|
| MD (ft) | OD (in) | Weight (lb/ft) | ID (in) |
| 2542.0 | 7 | 23.000 | 6.37 |

| CASING | | | | | |
|------------|------------|-------------------|------------|----------------|-------|
| MD (ft) | OD (in) | Weight (lb/ft) | ID (in) | Pressure (psi) | |
| | | | | Collapse | Burst |
| 4700.0 | 4 1/2 | 10.500 | 4.05 | 4010 | 4700 |

| FORMATIONS and SAFETY CHECKS | | | | | |
|------------------------------|----------------|------|-------------------|-----------------|---------------|
| MD (ft) | Pressure (psi) | | Formation Name | Lithol. code | Fluid code |
| | Fracture | Pore | | | |
| 4700.0 | 6765 | 1175 | OPEN HOLE | | |

| CALIPER and HOLE SIZE DATA | | | | | |
|----------------------------|-------------------|-------------------|-----------------------|--------------------------|-------------------------|
| MD (ft) | Caliper 1 (in) | Caliper 2 (in) | OH Volume (bbl) | Annular Excess (%) | Equiv. Diam. (in) |
| 4700.0 | 7 7/8 | 7 7/8 | 130.01 | | 7 7/8 |

Kickoff Point Depth : 0.0 ft

| SURVEY DATA | | | |
|-------------|--------------|------------------|-------------|
| MD (ft) | Inc (deg) | DLS (d/100ft) | TVD (ft) |
| 4700.0 | 0.0 | 0.00 | 4700.0 |



CemCADE TM Version 2.001
Well Cementing Recommendation

Client : IMCO ALUMINUM
Casing : 4 1/2 LINER
Well : DISPOSAL WELL
Field : MORGANTOWN
County : BUTLER
State : KENTUCKY
R.g Name : INDIANA DRCL.

FILL Description

| Fluid in Order Pumped | Volume (bbl) | Depth (ft) | | Fill (ft) |
|-------------------------|-----------------|------------|--------|--------------|
| | | Top | Bottom | |
| Annulus (Top to Bottom) | | | | |
| WATER | 69.91 | Surface | 3031.0 | 3031.0 |
| WATER | 5.00 | 3031.0 | 3154.3 | 123.2 |
| CW100 Wash | 10.00 | 3154.3 | 3400.7 | 246.5 |
| WATER | 10.00 | 3400.7 | 3647.2 | 246.5 |
| ZONELOCK | 10.00 | 3647.2 | 3893.7 | 246.5 |
| WATER | 10.00 | 3893.7 | 4140.2 | 246.5 |
| CLS A KCL | 22.71 | 4140.2 | 4700.0 | 559.8 |
| ----- | | | | |
| Casing (Bottom to Top) | | | | |
| Casing Shoe | | 4700.0 | | |
| Landing Collar | | 4700.0 | | |
| WATER | 50.83 | Surface | 4700.0 | 3174.7 |

Top of Cement (design) : 4140.2 ft
Top of Tail Slurry : 4140.2 ft

Cement Quantities

CLS A KCL : 93.0 sacks



CemCADE™ Version 2.5C.1
Well Cementing Recommendation

Client : IMCO ALUMINUM
Casing : 1 1/2 LINER
Well : DISPOSAL WELL
Field : MORGANTOWN
County : BUTLER
State : KENTUCKY
Rig Name : INDIANA DRGL.

PUMPING SCHEDULE

| Fluid Pumped | Pump Rate bbl/min | Fluid Volume bbl | Stage Time minutes | Elapsed Time minutes | Comments |
|--------------|-------------------------|------------------------|--------------------------|----------------------------|----------|
| START JOB: | | | CEMENT 4 1/2 LINER | | |
| WATER | 4.00 | 5.00 | 1:15 | 1:15 | |
| CW100 Wash | 4.00 | 10.00 | 2:30 | 3:45 | |
| WATER | 4.00 | 10.00 | 2:30 | 6:15 | |
| ZONELOCK | 4.00 | 10.00 | 2:30 | 8:45 | |
| WATER | 2.00 | 10.00 | 5:00 | 13:45 | |
| CLS A KCL | 5.00 | 22.71 | 4:32 | 18:17 | |
| WATER | 3.00 | 50.63 | 10:52 | 35:10 | |
| END JOB: | | | FLOW BACK-FLOAT HOLDING | | |



PACR PRINT

IMCO ALUMINUM
DISPOSAL WELL
ROBINSON
MORGANTOWNMT. CARMEL ILL.
CEMENT 4 1/2 LINER
01-03-7030
11-27-91

| TIME | PRESSURE | DENSITY | FLOW RATE | EVENTS |
|----------|-------------------|-------------------|----------------|-----------------------|
| HH:MM:SS | W.H. PRESS PSI | DL DENSITY PPG | UI FLOW BPM | |
| 19:58:28 | 0 | 5.0 | 0.0 | START JOB |
| 02:54:28 | 0 | 5.0 | 0.0 | |
| 02:55:00 | 0 | 5.0 | 0.0 | |
| 02:55:04 | | | | START PUMPING WATER |
| 02:56:00 | 1 | 7.6 | 0.0 | |
| 02:57:00 | 214 | 7.6 | 1.7 | |
| 02:57:08 | | | | SET PACKER |
| 02:58:00 | 542 | 7.6 | 4.9 | |
| 02:58:04 | | | | START PUMPING WASH |
| 02:59:16 | | | | RESET VOLUME |
| 02:59:00 | 528 | 7.6 | 4.9 | |
| 03:00:00 | 555 | 7.7 | 5.9 | |
| 03:00:32 | | | | START PUMPING WATER |
| 03:01:00 | 394 | 7.7 | 3.7 | |
| 03:02:00 | 422 | 7.7 | 4.2 | |
| 03:03:00 | 431 | 7.8 | 4.2 | START ZONE LOCK |
| 03:03:00 | | | | START PUMPING FLUID 1 |
| 03:04:00 | 510 | 7.9 | 4.6 | |
| 03:05:00 | 496 | 7.8 | 4.6 | |
| 03:05:24 | | | | START PUMPING WATER |
| 03:06:00 | 482 | 7.8 | 4.7 | |
| 03:07:00 | 112 | 7.6 | 3.2 | |
| 03:08:00 | 154 | 7.6 | 2.4 | |
| 03:09:00 | 163 | 8.5 | 2.6 | |
| 03:09:20 | | | | START CEMENT SLURRY |

PAC MicroVAX V2.0
27-NOV-91 13:54

Dow Schlumberger

PACR PRINT

IMCO ALUMINIUM
DISPOSAL WELL
ROBINSON
MORGANTOWN

MT. CARMEL ILL.
CEMENT 4 1/2 LINER
01-03-7030
11-27-91

| TIME | PRESSURE W.H. PRESS | DENSITY UI DENSITY | FLOW RATE UI FLOWI | EVENTS |
|----------|------------------------|-----------------------|-----------------------|--------|
| HH:MM:SS | PSI | PPG | BPM | |
| 03:10:00 | 473 | 15.2 | 4.4 | |
| 03:11:00 | 394 | 14.8 | 4.7 | |
| 03:12:00 | 329 | 14.8 | 5.0 | |
| 03:13:00 | 279 | 14.7 | 5.1 | |
| 03:14:00 | 223 | 14.5 | 5.2 | |
| 03:15:00 | 191 | 15.0 | 5.3 | |
| 03:16:00 | 168 | 15.1 | 5.3 | |
| 03:17:00 | 168 | 15.1 | 5.3 | |
| 03:18:00 | 168 | 14.7 | 5.3 | |
| 03:19:00 | 163 | 15.0 | 5.3 | |
| 03:20:00 | 135 | 14.5 | 5.3 | |
| 03:21:00 | 158 | 15.1 | 5.2 | |
| 03:22:00 | 154 | 15.1 | 5.2 | |
| 03:23:00 | 154 | 14.8 | 5.2 | |
| 03:24:00 | 149 | 15.0 | 5.2 | |
| 03:25:00 | 154 | 15.0 | 5.2 | |
| 03:26:00 | 144 | 14.8 | 5.2 | |
| 03:27:00 | 131 | 14.8 | 5.2 | |
| 03:28:00 | 149 | 14.9 | 5.2 | |
| 03:29:00 | 149 | 15.0 | 5.2 | |
| 03:30:00 | 163 | 14.8 | 5.2 | |
| 03:31:00 | 149 | 15.1 | 5.2 | |
| 03:32:00 | 158 | 15.1 | 5.2 | |
| 03:33:00 | 135 | 14.9 | 5.2 | |
| 03:34:00 | 163 | 15.0 | 5.2 | |



PACR PRINT

IMCO ALUMINUM
DISPOSAL WELL
ROBINSON
MORGANTOWN

MT. CARMEL ILL.
CEMENT 4 1/2 LINER
01-03-7020
11-27-91

| TIME | PRESSURE W.H. PRESS | DENSITY U1 DENSITY | FLOW RATE U1 FLOW1 | EVENTS |
|----------|------------------------|-----------------------|-----------------------|--------------------|
| HH:MM:SS | PSI | PPG | BPM | |
| 03:35:00 | 135 | 14.5 | 5.0 | |
| 03:36:00 | 66 | 14.4 | 4.2 | |
| 03:37:00 | 135 | 15.2 | 4.9 | |
| 03:38:00 | 131 | 15.4 | 4.8 | |
| 03:39:00 | 200 | 15.8 | 4.7 | |
| 03:40:00 | 24 | 14.4 | 3.7 | |
| 03:41:00 | 47 | 15.2 | 3.7 | |
| 03:42:00 | 33 | 14.3 | 3.3 | |
| 03:42:20 | | | | DROP TOP PLUG |
| 03:42:28 | | | | START DISPLACEMENT |
| 03:43:00 | 103 | 11.2 | 2.6 | |
| 03:44:00 | 0 | 8.9 | 0.0 | |
| 03:45:00 | 0 | 8.7 | 0.0 | |
| 03:46:00 | 1 | 8.7 | 4.2 | |
| 03:47:00 | 0 | 8.6 | 2.9 | |
| 03:48:00 | 43 | 8.6 | 2.4 | |
| 03:49:00 | 755 | 8.6 | 5.2 | |
| 03:50:00 | 741 | 8.6 | 4.7 | |
| 03:51:00 | 810 | 8.5 | 4.3 | |
| 03:52:00 | 866 | 8.6 | 4.0 | |
| 03:53:00 | 968 | 8.6 | 3.8 | |
| 03:54:00 | 1000 | 8.6 | 3.5 | |
| 03:55:00 | 1082 | 8.5 | 3.4 | |
| 03:56:00 | 1051 | 8.5 | 2.7 | |
| 03:57:00 | 1097 | 8.5 | 2.2 | |

PAC MicroVAX V2.0
27-NOV-91 13:54

Dowe Schlumberger



PACR PRINT

IMCO ALUMINUM
DISPOSAL WELL
ROBINSON
MORGANTOWN

MT. CARMEL ILL.
CEMENT 4 1/2 LINER
01-03-7030
11-27-91

| TIME | | PRESSURE | DENSITY | FLOW RATE | EVENTS |
|----------|--|-------------------|-------------------|-----------------|--|
| HH:MM:SS | | W.H. PRESS PSI | U1 DENSITY PPG | U1 FLOW1 BPM | |
| 03:58:00 | | 1139 | 8.5 | 1.9 | BUMP TOP PLUG |
| 03:59:00 | | 1328 | 8.5 | 2.9 | |
| 04:00:00 | | 1370 | 8.5 | 2.8 | |
| 04:01:00 | | 1768 | 8.5 | 2.4 | |
| 04:01:08 | | | | | BLEED-OFF PRESSURE |
| 04:02:00 | | 2059 | 8.5 | 0.0 | |
| 04:03:00 | | 2027 | 8.5 | 0.0 | RIG PULL OUT OFF STRINGER START REVERSE CIRCULATION |
| 04:03:24 | | | | | |
| 04:04:00 | | 1430 | 8.5 | 0.0 | REVERSE 43BBL CEMENT |
| 04:05:00 | | 1567 | 8.4 | 0.0 | |
| 04:05:28 | | | | | |
| 04:05:28 | | | | | |
| 04:06:00 | | 598 | 8.6 | 0.0 | |
| 04:06:36 | | | | | |
| 04:07:06 | | | | | |
| 04:08:00 | | 445 | 8.5 | 0.4 | |
| 04:09:00 | | 602 | 8.6 | 3.0 | |
| 04:09:00 | | 588 | 8.6 | 3.2 | |
| 04:10:00 | | 588 | 8.6 | 3.1 | |
| 04:11:00 | | 584 | 8.6 | 3.2 | |
| 04:12:00 | | 588 | 8.6 | 3.1 | |
| 04:13:00 | | 584 | 8.5 | 3.1 | |
| 04:14:00 | | 579 | 8.6 | 3.1 | |
| 04:15:00 | | 584 | 8.6 | 2.1 | |
| 04:16:00 | | 538 | 8.6 | 3.1 | |
| 04:17:00 | | 514 | 8.6 | 3.2 | |



PACR PRINT

IMCC ALUMINUM
DISPOSAL WELL
ROBINSON
MORGANTOWN

MT. CARMEL ILL.
CEMENT 4 1/2 LINER
01-03-7030
11-27-91

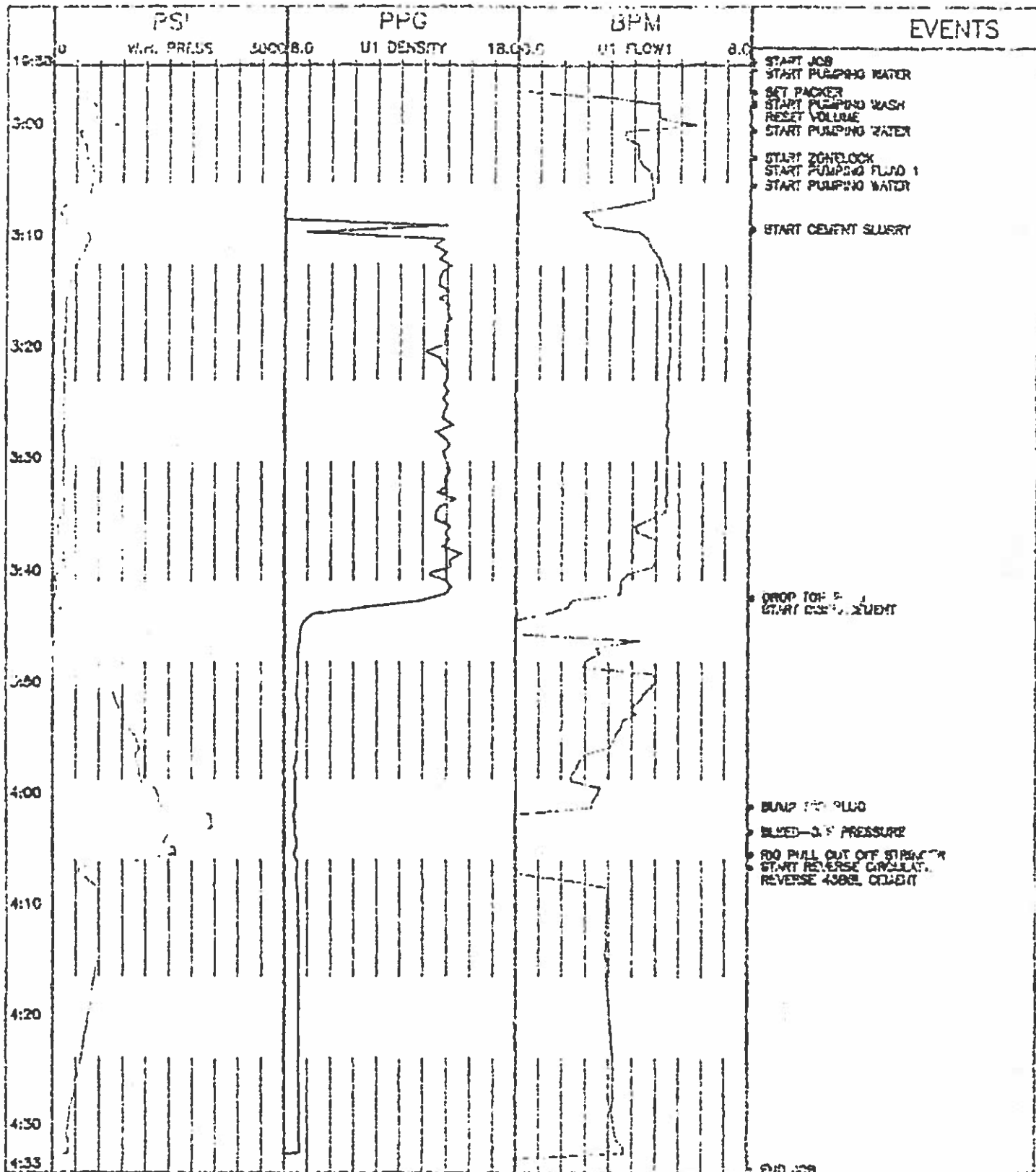
| TIME | PRESSURE W.H. PRESS PSI | DENSITY U1 DENSITY PPG | FLOW RATE U1 FLOW BPM | EVENTS |
|----------|-------------------------------|------------------------------|-----------------------------|--------|
| HH:MM:SS | | | | |
| 04:18:00 | 501 | 8.6 | 3.2 | |
| 04:19:00 | 473 | 8.6 | 3.2 | |
| 04:20:00 | 450 | 8.6 | 3.2 | |
| 04:21:00 | 427 | 8.6 | 3.3 | |
| 04:22:00 | 394 | 8.6 | 3.3 | |
| 04:23:00 | 362 | 8.5 | 3.3 | |
| 04:24:00 | 348 | 8.6 | 3.4 | |
| 04:25:00 | 311 | 8.6 | 3.4 | |
| 04:26:00 | 283 | 8.6 | 3.3 | |
| 04:27:00 | 260 | 8.5 | 3.4 | |
| 04:28:00 | 223 | 8.7 | 3.3 | |
| 04:29:00 | 214 | 8.6 | 3.4 | |
| 04:30:00 | 205 | 8.6 | 3.4 | |
| 04:31:00 | 205 | 8.5 | 3.5 | |
| 04:32:00 | 200 | 8.6 | 3.7 | |
| 04:33:00 | 0 | 5.0 | 0.0 | |
| 04:33:56 | 0 | 5.0 | 0.0 | |

PACR PLOT



INCO ALUMINUM
DISPOSAL WELL
ROBINSON
MORGANTOWN

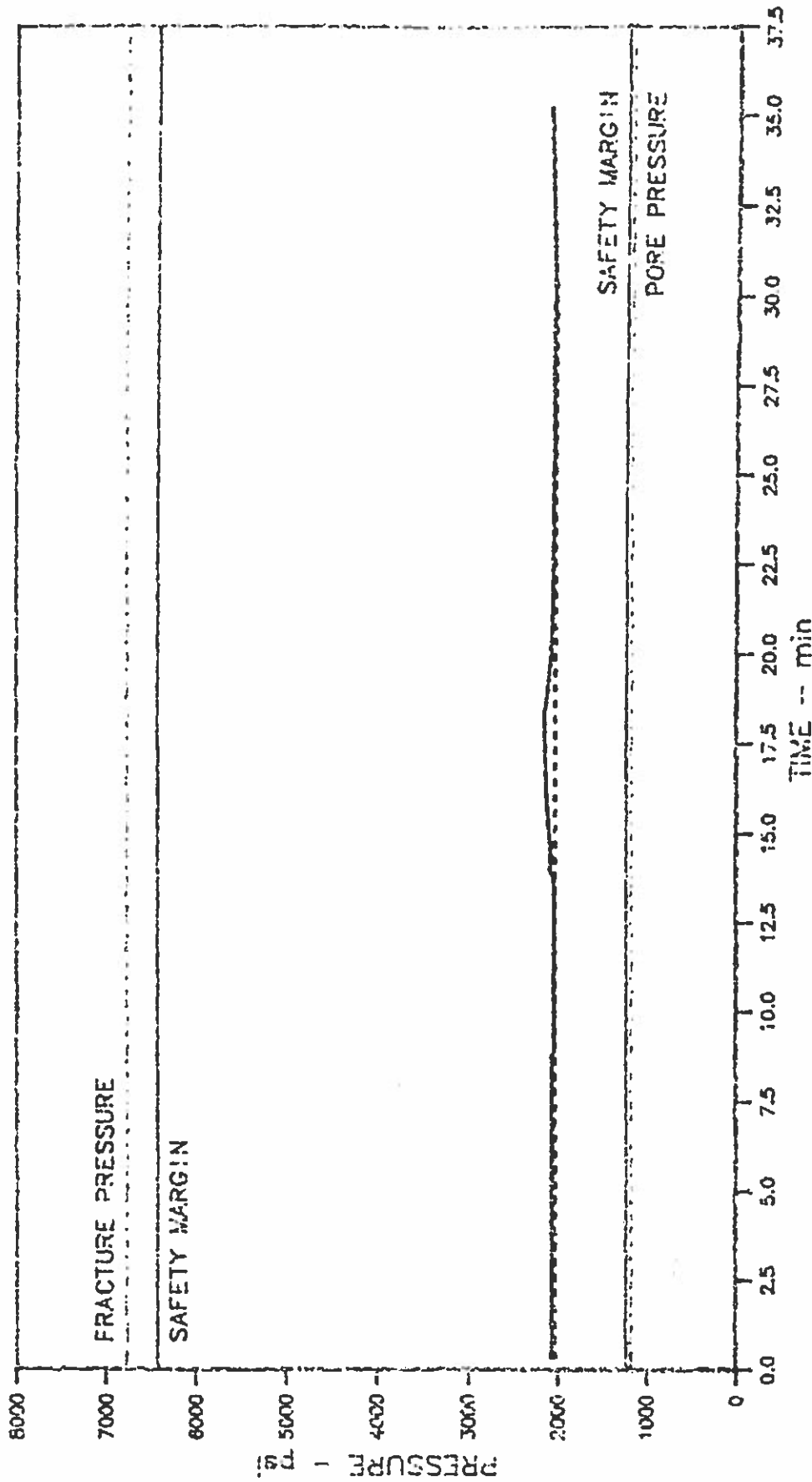
MT. CARMEL TLL
CEMENT 4 1/2 LINER
01-03-7030
11-27-81



CemCADE PLACEMENT DESIGN

PLACEMENT PRESSURE - 1000 PSI

WELL : DISPOSL 4514
 FIELD : WPC-001
 CEMENT : 1000 PSI
 CASE : 2.001
 DATE : 1964



— TOTAL PRESSURE

----- HYDROSTATIC PRESSURE

PLOT SHOWS TOTAL ANNULAR PRESSURE AND THE HYDROSTATIC COMPONENT



OSCAR 2.851

27 NOV 1981

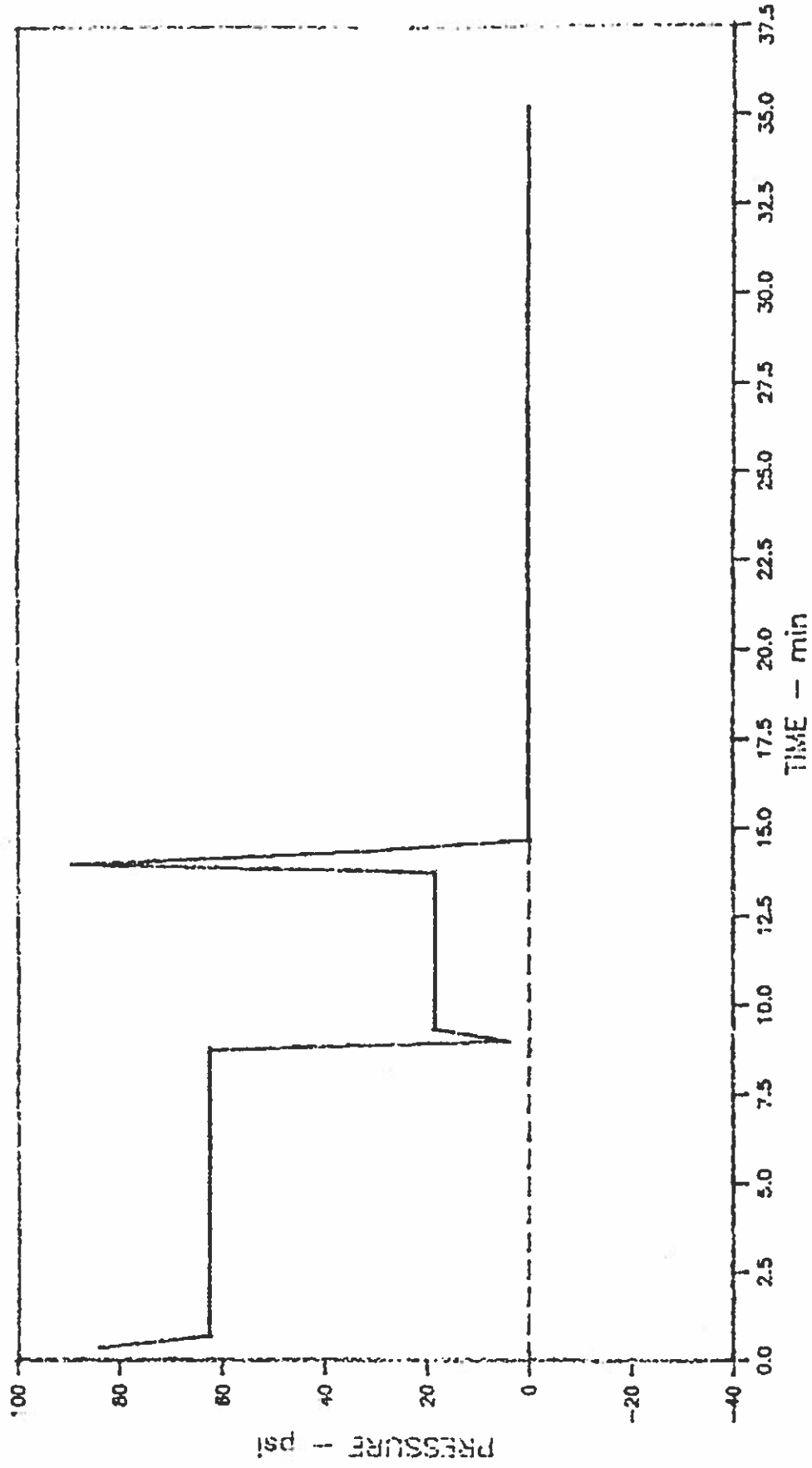
2:18

1985 Basil Sablunger

HARBOCK

CemCADE PLACEMENT DESIGN

SURFACE PRESSURES



11-3

HOWE-SCHLUMBERGER INCORPORATED

Well Name: U.S. 100
 Location: 100-1-24
 Formation: 2nd 2nd 1/2
 Date: 11/2

Well Type: 2nd 2nd 1/2
 Well Depth: 11/2

Well Status: 2nd 2nd 1/2
 Well Condition: 2nd 2nd 1/2

Well Completion: 2nd 2nd 1/2
 Well Completion Date: 2nd 2nd 1/2

Well Completion Details: 2nd 2nd 1/2
 Well Completion Details: 2nd 2nd 1/2

Well Completion Details: 2nd 2nd 1/2
 Well Completion Details: 2nd 2nd 1/2

Well Completion Details: 2nd 2nd 1/2
 Well Completion Details: 2nd 2nd 1/2

| ITEM | DESCRIPTION | UNIT | VALUE |
|------|-------------|------|-------|
| 1 | 1st 1/2 | 1/2 | 1/2 |
| 2 | 2nd 1/2 | 1/2 | 1/2 |
| 3 | 3rd 1/2 | 1/2 | 1/2 |
| 4 | 4th 1/2 | 1/2 | 1/2 |
| 5 | 5th 1/2 | 1/2 | 1/2 |
| 6 | 6th 1/2 | 1/2 | 1/2 |
| 7 | 7th 1/2 | 1/2 | 1/2 |
| 8 | 8th 1/2 | 1/2 | 1/2 |
| 9 | 9th 1/2 | 1/2 | 1/2 |
| 10 | 10th 1/2 | 1/2 | 1/2 |

| ITEM | DESCRIPTION | UNIT | VALUE |
|------|-------------|------|-------|
| 1 | 1st 1/2 | 1/2 | 1/2 |
| 2 | 2nd 1/2 | 1/2 | 1/2 |
| 3 | 3rd 1/2 | 1/2 | 1/2 |
| 4 | 4th 1/2 | 1/2 | 1/2 |
| 5 | 5th 1/2 | 1/2 | 1/2 |
| 6 | 6th 1/2 | 1/2 | 1/2 |
| 7 | 7th 1/2 | 1/2 | 1/2 |
| 8 | 8th 1/2 | 1/2 | 1/2 |
| 9 | 9th 1/2 | 1/2 | 1/2 |
| 10 | 10th 1/2 | 1/2 | 1/2 |

| TIME | PERCENT | VOLUME PUMPED | WELL SCHEDULED FOR | WELL SCHEDULED FOR | WELL SCHEDULED FOR | WELL SCHEDULED FOR |
|------|---------|---------------|--------------------|--------------------|--------------------|--------------------|
| 0254 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0256 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0257 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0258 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0259 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0300 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0301 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0302 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0303 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0304 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0305 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0306 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0307 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0308 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0309 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0310 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0311 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0312 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0313 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0314 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0315 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0316 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0317 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0318 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0319 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0320 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0321 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0322 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0323 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0324 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0325 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0326 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0327 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0328 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0329 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0330 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0331 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0332 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0333 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0334 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0335 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0336 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0337 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0338 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0339 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0340 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0341 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0342 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0343 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0344 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0345 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0346 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0347 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0348 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0349 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0350 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0351 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0352 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0353 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0354 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0355 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0356 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0357 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0358 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0359 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0360 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0361 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0362 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0363 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0364 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0365 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0366 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0367 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0368 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0369 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0370 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0371 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0372 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0373 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0374 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0375 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0376 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0377 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0378 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0379 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0380 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0381 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0382 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0383 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0384 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0385 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0386 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0387 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0388 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0389 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0390 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0391 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0392 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0393 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0394 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0395 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0396 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0397 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0398 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0399 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0400 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0401 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0402 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0403 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0404 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0405 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0406 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0407 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0408 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0409 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0410 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0411 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0412 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0413 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0414 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0415 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0416 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0417 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0418 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0419 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0420 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0421 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0422 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0423 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0424 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0425 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0426 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0427 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0428 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0429 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0430 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0431 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0432 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0433 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0434 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0435 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0436 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0437 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0438 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0439 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0440 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0441 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0442 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0443 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0444 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0445 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0446 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0447 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0448 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0449 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0450 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0451 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0452 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0453 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0454 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0455 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0456 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0457 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0458 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0459 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0460 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0461 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0462 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0463 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0464 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0465 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0466 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0467 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0468 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0469 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0470 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0471 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0472 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0473 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0474 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0475 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0476 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0477 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0478 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0479 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0480 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0481 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0482 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0483 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0484 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0485 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0486 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0487 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0488 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0489 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0490 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0491 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0492 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0493 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0494 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0495 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0496 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0497 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0498 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0499 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0500 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0501 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0502 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0503 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0504 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0505 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0506 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0507 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0508 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0509 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0510 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0511 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0512 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0513 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0514 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0515 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0516 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0517 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0518 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0519 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0520 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0521 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0522 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0523 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0524 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0525 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0526 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0527 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0528 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0529 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0530 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0531 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0532 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0533 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0534 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0535 | 7.5 | 4 | 4 | 4 | 4 | 4 |
| 0536 | 7.5 | | | | | |



DOWELL SCHLUMBERGER INCORPORATED

SCALE TICKET FOR ELECTRONIC WEIGHING DEVICES

Nº 234225

WEIGHED BY 11-1-10 PRODUCT 11-1-10
NO. 11-1-10 BILL OF LADING NO. 11-1-10 TRUCK NO. 11-1-10

WEIGHT 47440 LB GROSS
20:23 24NOV91

TARE

WEIGHT 27200 LB
11:16 27NOV91 NET

USED 19740 lbs

SELLER ☐ DISTRICT 11-1-10 DATE 11-1-10
BUYER ☒ TIME 11-1-10

ADDRESS 11-1-10 STATE KY ZIP 40061 DRIVER ON ☒ OFF ☐



DOWELL SCHLUMBERGER INCORPORATED

SCALE TICKET FOR ELECTRONIC WEIGHING DEVICES

Nº 234226

WEIGHED BY 11-1-10 PRODUCT 11-1-10
NO. 11-1-10 BILL OF LADING NO. 1-5-7030 TRUCK NO. 11-1-10

WEIGHT 33220 LB GROSS
20:02 24NOV91

TARE

WEIGHT 41640 LB
11:14 27NOV91 NET

USED 44080 lbs

SELLER ☐ DISTRICT 11-1-10 DATE 11-1-10
BUYER ☒ TIME 11-1-10

ADDRESS 11-1-10 STATE KY ZIP 41226 DRIVER ON ☒ OFF ☐



PACRLOG

Company W. J. Sullivan
Well 2010-1 Field Massk
District Mississippi SIK 2010
Type Service Artificial Lift
Engineer W. J. Sullivan
Date/Time Start Job
Remarks

Value 1 : Unit 1 Pressure
Value 2 : Units 1 and 2 Average Density
Value 3 : Units 1 and 2 Total Flow rate
Value 4 : Disabled

Volume is computed from
Units 1 and 2 Total Flow rate
Scan Period (Sec) : 4s
Plugback Recording Rate was 4 seconds

| TIME | VAL 1 (PSI) | VAL 2 (KPC) | VAL 3 (GPM) | VAL 4 () | VOLUME (SSG) |
|-------------------------------|----------------|----------------|----------------|--------------|-----------------|
| 19:59 | 734 | 0 | 0 | | 0 |
| 19:59 | 734 | 0 | 0 | | 0 |
| PAUSE | | | | | |
| 02:54 | 734 | 0 | 0 | | 0 |
| START PUMPING WATER | | | | | |
| 02:54 | 734 | 0 | 0 | | 0 |
| 02:55 | 0 | 0 | 0 | | 0 |
| | 10 | 7.57 | 0.04 | | 0 |
| SET PACKER 7/0 | | | | | |
| 02:56 | 350 | 7.59 | 2.47 | | 1.1 |
| | 340 | 7.59 | 4.43 | | 4.3 |
| START PUMPING WASH | | | | | |
| 02:57 | 340 | 7.61 | 4.04 | | 3.5 |
| RESET VOLUME | | | | | |
| 02:58 | 340 | 7.57 | 4.62 | | 6.5 |
| | 350 | 7.60 | 4.68 | | 3.8 |
| | 310 | 7.64 | 6.17 | | 8.4 |
| START PUMPING WATER | | | | | |
| 02:59 | 350 | 7.68 | 2.62 | | 13.4 |
| | 430 | 7.72 | 4.11 | | 14.1 |
| | 420 | 7.74 | 4.13 | | 17.4 |
| | 430 | 7.75 | 4.14 | | 20.7 |
| START PUMPING FLUID 1 3000PSI | | | | | |
| 03:02 | 430 | 7.74 | 4.14 | | 21.0 |
| | 510 | 7.75 | 4.33 | | 24.6 |
| | 550 | 7.76 | 4.35 | | 28.3 |
| START PUMPING WATER | | | | | |
| 03:05 | 492 | 7.79 | 4.64 | | 32.0 |
| | 498 | 7.82 | 4.64 | | 35.0 |
| | 110 | 7.84 | 2.71 | | 28.8 |
| | 100 | 7.87 | 3.19 | | 40.6 |
| | 180 | 13.15 | 3.20 | | 42.8 |
| START CEMENT SLURRY | | | | | |
| 03:09 | 440 | 9.46 | 4.51 | | 48.3 |
| RESET VOLUME | | | | | |
| 03:09 | 450 | 11.44 | 4.60 | | 48.2 |
| 03:13 | 470 | 14.94 | 4.47 | | 3.13 |
| | 402 | 13.01 | 4.74 | | 7.13 |
| | 330 | 14.00 | 4.94 | | 11.6 |
| | 300 | 14.52 | 5.00 | | 15.2 |
| | 250 | 14.64 | 5.14 | | 19.3 |
| | 200 | 14.119 | 5.20 | | 23.0 |
| | 160 | 14.77 | 5.27 | | 27.3 |
| 03:15 | 170 | 14.11 | 5.26 | | 31.8 |
| | 160 | 14.93 | 5.26 | | 36.1 |
| | 170 | 14.06 | 5.24 | | 40.4 |
| | 170 | 14.06 | 5.24 | | 44.6 |
| | | 14.06 | 5.24 | | 48.8 |
| | | | 5.24 | | 53.0 |
| 03:20 | 160 | 14.92 | 5.24 | | 57.3 |
| | 170 | 14.06 | 5.24 | | 61.5 |

Engineer: WILLIAM J. BROWN
 Date: Time Stamp: 100
 Remarks:

Value 1: Unit 1 Pressure
 Value 2: Unit 1 and 2 Average Density
 Value 3: Unit 1 and 2 Total Flow rate
 Value 4: Standoff

Volume is computed from
 Units 1 and 2 Total Flow rate
 Scan Period (Sec): 40
 Playback: Recording Rate was 4 columns

| TIME | VAL 1 (PSI) | VAL 2 (PPM) | VAL 3 (GPM) | VAL 4 (INCH) | VOLUME (GAL) |
|---------------------|----------------|----------------|----------------|-----------------|-----------------|
| 19 59 | 877 | 0 | 0 | | 0 |
| 19 59 | 877 | 0 | 0 | | 0 |
| PAUSE | | | | | |
| 02 54 | 791 | 0 | 0 | | 0 |
| START PUMPING WATER | | | | | |
| 02 54 | 791 | 0 | 0 | | 0 |
| 02 55 | 791 | 0 | 0 | | 0 |
| 10 | 791 | 0 26 | | | 0 |
| SET PACKER TOP | | | | | |
| 02 56 | 791 | 7 59 | 2 47 | | 1 1 |
| 02 56 | 791 | 7 59 | 4 00 | | 4 9 |
| START PUMPING CASH | | | | | |
| 02 57 | 791 | 7 59 | 4 54 | | 5 5 |
| RESET VOLUME | | | | | |
| 02 59 | 791 | 7 57 | 4 55 | | 4 5 |
| 02 59 | 791 | 7 57 | 4 55 | | 4 5 |
| 02 59 | 791 | 7 57 | 4 55 | | 4 5 |
| START PUMPING WATER | | | | | |
| 03 00 | 791 | 7 53 | 5 22 | | 10 5 |
| 490 | 7 53 | 4 11 | | 14 1 | |
| 433 | 7 54 | 4 13 | | 17 4 | |
| 431 | 7 55 | 4 16 | | 20 7 | |
| START PUMPING FLUID | | | | | |
| 03 02 | 430 | 7 54 | 4 15 | | 21 0 |
| 510 | 7 56 | 4 22 | | 24 6 | |
| 500 | 7 56 | 4 25 | | 26 3 | |
| START PUMPING WATER | | | | | |
| 03 03 | 490 | 7 59 | 4 51 | | 32 0 |
| 490 | 7 59 | 4 54 | | 35 9 | |
| 110 | 7 54 | 5 71 | | 38 6 | |
| 105 | 7 57 | 5 15 | | 40 6 | |
| 100 | 15 15 | 5 62 | | 42 8 | |
| START CEMENT SLURRY | | | | | |
| 03 05 | 440 | 9 46 | 4 51 | | 45 3 |
| RESET VOLUME | | | | | |
| 03 09 | 450 | 11 44 | 4 50 | | 46 2 |
| 03 10 | 430 | 14 54 | 4 47 | | 5 0 |
| 400 | 15 01 | 4 74 | | 7 3 | |
| 320 | 14 80 | 4 54 | | 11 2 | |
| 260 | 14 52 | 5 00 | | 15 2 | |
| 200 | 14 64 | 5 14 | | 19 3 | |
| 200 | 14 09 | 5 20 | | 22 0 | |
| 180 | 14 77 | 5 27 | | 27 7 | |
| 03 12 | 170 | 15 11 | 5 25 | | 31 5 |
| 160 | 14 53 | 5 26 | | 35 1 | |
| 170 | 15 05 | 5 24 | | 40 4 | |
| 150 | 14 66 | 5 23 | | 44 6 | |
| 150 | 15 00 | 5 26 | | 48 6 | |
| 130 | 14 47 | 5 25 | | 53 0 | |
| 03 20 | 140 | 14 82 | 5 24 | | 57 0 |
| 170 | 14 38 | 5 25 | | 61 3 | |
| 160 | 15 06 | 5 18 | | 65 6 | |
| 140 | 14 67 | 5 22 | | 69 0 | |
| 150 | 14 56 | 5 20 | | 74 0 | |
| 170 | 15 16 | 5 17 | | 79 1 | |
| 03 22 | 120 | 14 09 | 5 20 | | 82 3 |
| 120 | 15 31 | 5 20 | | 86 3 | |
| 140 | 14 58 | 5 22 | | 90 7 | |
| 150 | 14 57 | 5 17 | | 94 9 | |
| 150 | 15 13 | 5 15 | | 99 0 | |
| 120 | 14 99 | 5 20 | | 103 1 | |
| 03 30 | 120 | 15 10 | 5 17 | | 107 3 |
| 120 | 15 10 | 5 17 | | 111 3 | |
| 140 | 15 14 | 5 17 | | 115 5 | |
| 140 | 14 66 | 5 19 | | 119 7 | |
| 140 | 14 73 | 5 13 | | 123 0 | |
| 120 | 14 30 | 5 11 | | 127 3 | |
| 70 | 14 72 | 4 42 | | 131 3 | |
| 03 35 | 10 | 14 40 | 4 16 | | 135 1 |
| 120 | 14 54 | 4 25 | | 139 7 | |
| 120 | 14 61 | 4 30 | | 142 6 | |
| 120 | 15 12 | 4 26 | | 146 4 | |
| 120 | 13 67 | 4 47 | | 150 2 | |
| 20 | 14 41 | 4 47 | | 153 8 | |
| 03 40 | 20 | 14 87 | 5 40 | | 155 5 |
| 20 | 15 22 | 5 33 | | 159 4 | |
| CROP TOP PLUG | | | | | |
| 03 42 | 224 | 15 47 | 5 40 | | 161 5 |
| START DISPERSED | | | | | |
| 03 42 | 224 | 15 37 | 5 40 | | 161 5 |
| 20 | 15 31 | 5 40 | | 163 9 | |
| 224 | 15 31 | 5 40 | | 163 9 | |
| 224 | 15 31 | 5 40 | | 163 9 | |
| RESET VOLUME | | | | | |
| 03 45 | 224 | 15 40 | 5 40 | | 167 5 |

| | | | |
|---------------------------|-------|-------|-------|
| 120 | 15.10 | 3.15 | 111.4 |
| 160 | 15.14 | 3.13 | 113.2 |
| 143 | 14.88 | 3.16 | 119.7 |
| 140 | 14.70 | 3.12 | 123.8 |
| 130 | 14.70 | 3.11 | 127.9 |
| 70 | 14.72 | 4.42 | 131.8 |
| 03 30 | 60 | 14.40 | 135.1 |
| | 120 | 14.84 | 138.7 |
| | 120 | 14.41 | 142.5 |
| | 120 | 15.12 | 146.4 |
| | 180 | 15.67 | 150.2 |
| | 20 | 14.41 | 153.8 |
| 03 40 | 20 | 14.47 | 156.5 |
| | 20 | 15.26 | 159.4 |
| ONOP TOP PLUS | | | |
| 03 42 | 40 | 15.67 | 161.5 |
| START BLEED-OFF | | | |
| 03 48 | 40 | 15.37 | 161.5 |
| | 20 | 9.21 | 163.9 |
| | 20 | 0 | 163.9 |
| | 100 | 0 | 163.9 |
| RESET VOLUME | | | |
| 03 43 | 0 | 8.45 | 163.9 |
| | 40 | 8.83 | 2.3 |
| | 40 | 8.59 | 4.6 |
| | 20 | 8.50 | 5.8 |
| | 100 | 8.57 | 6.7 |
| | 700 | 9.57 | 12.5 |
| | 700 | 8.54 | 13.3 |
| 03 50 | 800 | 8.52 | 13.3 |
| | 800 | 8.59 | 23.2 |
| | 900 | 8.51 | 25.5 |
| | 900 | 8.59 | 29.6 |
| | 1000 | 8.55 | 32.4 |
| | 1000 | 8.55 | 35.1 |
| 03 55 | 1100 | 8.53 | 37.7 |
| | 1000 | 8.49 | 39.5 |
| | 1100 | 8.43 | 41.3 |
| | 1100 | 8.47 | 42.9 |
| | 1300 | 8.47 | 44.7 |
| | 1300 | 8.45 | 47.0 |
| 04 00 | 1300 | 8.48 | 48.2 |
| BUMP TOP PLUS | | | |
| 04 00 | 2070 | 8.45 | 50.1 |
| | 2040 | 0 | 50.1 |
| | 2040 | 0 | 50.1 |
| BLEED-OFF FASCUNE | | | |
| 04 03 | 1430 | 0 | 50.1 |
| | 1430 | 8.51 | 53.1 |
| | 1500 | 0 | 50.2 |
| START REVERSE CIRCULATION | | | |
| 04 05 | 1180 | 0 | 50.2 |
| | 320 | 0 | 50.2 |
| RESET VOLUME | | | |
| 04 06 | 330 | 0 | 50.2 |
| | 470 | 8.52 | 1.1 |
| | 600 | 8.53 | 3.4 |
| | 530 | 8.57 | 9.2 |
| | 580 | 8.58 | 6.4 |
| 04 10 | 500 | 8.56 | 11.0 |
| | 560 | 8.56 | 13.3 |
| | 580 | 8.60 | 15.0 |
| | 570 | 8.60 | 18.2 |
| | 570 | 8.62 | 21.0 |
| | 570 | 8.60 | 23.3 |
| 04 15 | 570 | 8.62 | 26.0 |
| | 530 | 8.60 | 28.3 |
| | 510 | 8.62 | 31.0 |
| | 490 | 8.60 | 33.6 |
| | 470 | 8.60 | 36.2 |
| | 460 | 8.60 | 38.7 |
| 04 20 | 430 | 8.60 | 41.3 |
| | 420 | 8.61 | 43.6 |
| | 390 | 8.62 | 46.4 |
| | 370 | 8.60 | 49.2 |
| | 360 | 8.61 | 51.9 |
| | 340 | 8.60 | 54.6 |
| | 310 | 8.60 | 57.3 |
| 04 25 | 270 | 8.60 | 60.0 |
| | 270 | 8.62 | 62.7 |
| | 240 | 8.62 | 65.4 |
| | 220 | 8.63 | 68.2 |
| | 200 | 8.61 | 70.7 |
| | 190 | 8.60 | 73.1 |
| 04 30 | 150 | 8.60 | 75.2 |
| | 200 | 8.64 | 79.1 |
| | 0 | 8.62 | 81.8 |
| | 200 | 0 | 81.8 |
| | 200 | 0 | 81.8 |
| END JOB | | | |
| 04 33 | 200 | 0 | 81.8 |
| END OF RE-LAY | | | |

BASIC ACQUISITION MODE

DEFAULT JOB

REAL-TIME MODE - OIL UNITS

DATE 27/11/91 TIME 04:37



McCoy & McCoy Environmental Consultants, Inc.
A Subsidiary of McCoy & McCoy, Inc.

NOTICE OF INSPECTION



INSPECTION CONTRACTOR

McCoy & McCoy, Inc.
P.O. Box 11279
Lexington, Kentucky 40574
606-299-7775

FIRM TO BE INSPECTED

IMCO Recycling, Inc.

ADDRESS (EPA Regional Office)

Environmental Protection Agency
Region IV, Ground Water Protection Branch
345 Courtland St. NE
Atlanta, Georgia 30365
404-347-3379

This document constitutes written notice pursuant to 42 U.S.C. § 300j-4 (b)(1) of inspection by duly authorized personnel of the U.S. Environmental Protection Agency of this facility noted below.

REASON FOR INSPECTION *New Well Construction*

The purpose of inspection is to determine whether the person (including any corporation or partnership) subject to any applicable underground injection control program has acted or is acting in compliance with The Safe Drinking Water Act and all regulations promulgated thereunder, including underground injection control (UIC) regulations and any applicable permit or rule.

IMCO Well #1

Ran 2 3/8" tubing with 7' long hanger and 2393' of 4 1/2" casing to 4718'. Hung casing at 2318'.

Pumped 650 sks = 158 bbls, weight = 14.8 lbs/gal, yield = 1.37 cu. ft./sk

Cement: Class A w/ 2% gyp-seal, 3% KCl, .2% Antifoam (D53), .2% Calcium lignosulfate (D13), and .6% D127 Cement work by Dowell-Schlumberger.

After pumping cement (135% calculated volume), rubber plugs were chased w/ 50 bbls water. Then tubing was disconnected from hanger and excess cement was circulated out of annular space between 7" casing and tubing.

Section 1445(b) of the SDWA (42 U.S.C. § 300j-4 (b)) is quoted on the reverse of this form.

Receipt of this Notice of Inspection is hereby acknowledged.

FIRM REPRESENTATIVE

Infom Tamm

DATE

11/27/91

INSPECTOR (McCoy & McCoy)

David M. Oldham

EXHIBIT L-7
ANNULUS AND PACKER PRESSURE TEST
DATA

HALLIBURTON SERVICES

NO. 216027

FORM 1908 R-11

| | | | | | |
|--|------------------------------------|-------------------------------|---|--------------------------|-----------------------------------|
| WELL NO. - FARM OR LEASE NAME 1 Prince Revolving | | COUNTY Butler | STATE KS | CITY / OFFSHORE LOCATION | DATE 2-5-92 |
| TO H.M. Engineering | | OWNER S. B. Inc. | TICKET TYPE (CHECK ONE) SERVICE <input checked="" type="checkbox"/> SALES <input type="checkbox"/> | | NITROGEN <input type="checkbox"/> |
| ADDRESS 3840 South 163rd E Mo. | | CONTRACTOR Robinson | LOCATION 1 Helenwood | | CODE 759 |
| CITY, STATE, ZIP Tulsa, OK 74116 | | SHIPPED VIA Homeco | FREIGHT CHARGES <input type="checkbox"/> PD <input type="checkbox"/> COLLECT | | LOCATION 2 |
| WELL TYPE Dep. 11 | WELL CATEGORY Willcut 03 | WELL PERMIT NO. | DELIVERED TO Morgan-Town, Ky. | | LOCATION 3 |
| TYPE AND PURPOSE OF JOB Pressure Test Packer 410 | | B- | ORDER NO. | | REFERRAL LOCATION |

As consideration, the above-named Customer agrees to pay Halliburton in accord with the rates and terms stated in Halliburton's current price list. Payment payable NET by the 30th of the following month after date of invoice. Upon Customer's default in payment of Customer's account by the last day of the month following the month in which the invoice is dated, Customer agrees to pay interest thereon after default at the highest lawful contract rate applicable, but never to exceed 18% per annum, in the event it becomes necessary to employ an attorney to enforce collection of said account. Customer agrees to pay all collection costs and attorney fees in the amount of 20% of the amount of the unpaid account. These terms and conditions shall be governed by the law of the state whose services are performed or equipment or materials are furnished.

Halliburton warrants only title in the products, supplies and materials and that the same are free from defects in workmanship and materials. THERE ARE NO WARRANTIES, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE WHICH EXTEND BEYOND THOSE STATED IN THE IMMEDIATELY PRECEDING SENTENCE. Halliburton's liability and customer's exclusive remedy in any case of action (whether in contract, tort, product liability, breach of warranty or otherwise) arising out of the sale of use of any product, supplies or materials is expressly limited to the replacement of such product, supplies or materials on their return to Halliburton or, at Halliburton's option, to the allowance to the customer of credit for the cost of such items. In no event shall Halliburton be liable for special, incidental, indirect, punitive or consequential damages.

| PRICE REFERENCE | SECONDARY REF OR PART NO. | LOC | ACCOUNT | DESCRIPTION | UNITS 1 | UNITS 2 | UNIT PRICE | AMOUNT |
|------------------------|---------------------------|-----|---------|-----------------|---------|---------|------------|----------|
| 000-117 | | | | MILEAGE | 200.00 | | 2.60 | 520.00 |
| 200-131 | | | | Delivery Charge | 200.00 | | 2.60 | 520.00 |
| 011-205 | | | | Pumping Charge | 41.00 | | | 1065.00 |
| 218-759 | | | | Service Charge | | | | 75.00 |
| 218-743 | | | | Arbit | 32.00 | | 32.00 | 1024.00 |
| 011-234 | | | | Adj. H. 200.00 | 120.00 | | 120.00 | 14400.00 |
| THIS IS NOT AN INVOICE | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

AS PER ATTACHED BULK MATERIAL DELIVERY TICKET NO. **B-**WAS JOB SATISFACTORILY COMPLETED? ☒WAS OPERATION OF EQUIPMENT SATISFACTORY? ☒WAS PERFORMANCE OF PERSONNEL SATISFACTORY? ☒CUSTOMER OR HIS AGENT (PLEASE PRINT)
WAYCHOFFCUSTOMER OR HIS AGENT (SIGNATURE)
[Signature]

WE CERTIFY THAT THE FARM LABOR STANDARDS ACT OF 1938, AS AMENDED HAS BEEN COMPLIED WITH IN THE PRODUCTION OF GOODS AND OR WITH RESPECT TO SERVICES FURNISHED UNDER THIS CONTRACT. THE EMPLOYEES HAVE BEEN PAID.

Larry [Signature]
HALLIBURTON OPERATOR

HALLIBURTON APPROVAL

CUSTOMER

SUB TOTAL

2485.00

APPLICABLE TAXES V BE ADDED ON INVOICE

HALLBURTON
SERVICES

SUMMARY

HALLBURTON
LOCATION

Helenwood Town

BILLED ON
TICKET NO.

216027-9

WELL DATA

| | | | | | | | | |
|---------------------|--------------------------|-----|-----|-----|--------|--------|-------|----|
| FIELD | 100 | SEC | TWP | RNG | COUNTY | Butler | STATE | Ky |
| FORMATION NAME | TYPE | | | | | | | |
| FORMATION THICKNESS | FROM TO | | | | | | | |
| PROD. OIL | 3PD. WATER 3PD. GAS MCFD | | | | | | | |
| PRESENT PROD. OIL | 3PD. WATER 3PD. GAS MCFD | | | | | | | |
| COMPLETION DATE | MUD TYPE MUD WT. | | | | | | | |
| PACKER TYPE | SET AT | | | | | | | |
| BOTTOM HOLE TEMP | PRESSURE | | | | | | | |
| MISC. DATA | TOTAL DEPTH 6450 | | | | | | | |

JOB DATA

| | | | | | | | |
|------------|--------|-------------|--------|-------------|--------|---------------|--------|
| CALLED OUT | | ON LOCATION | | JOB STARTED | | JOB COMPLETED | |
| DATE | 2-5-92 | DATE | 2-5-92 | DATE | 2-5-92 | DATE | 2-5-92 |
| TIME | 5:00 | TIME | 11:00 | TIME | 12:30 | TIME | 16:20 |

PERSONNEL AND SERVICE UNITS

| NAME | UNIT NO. & TYPE | LOCATION |
|----------|-----------------|----------|
| 83008 | | |
| L Jettis | 90175 | 25920 |
| B5347 | P | " |
| J. AUNT | 52455 | " |
| B1553 | P | " |
| W Janc | 50734 | " |

| | | |
|-----------------------|---------|------------|
| TREAT. FLUID | DENSITY | LB/GAL API |
| DISPL. FLUID | DENSITY | LB/GAL API |
| PROP. TYPE | SIZE | LB. |
| PROP. TYPE | SIZE | LB. |
| ACID TYPE | GAL | % |
| ACID TYPE | GAL | % |
| ACID TYPE | GAL | % |
| STANT TYPE | GAL | IN |
| NE AGENT TYPE | GAL | IN |
| FLUID LOSS ADD. TYPE | GAL-LB. | IN |
| GELLING AGENT TYPE | GAL-LB. | IN |
| FRIC. RED. AGENT TYPE | GAL-LB. | IN |
| BREAKER TYPE | GAL-LB. | IN |
| BLOCKING AGENT TYPE | GAL-LB. | |
| PERFPAC BALLS TYPE | QTY. | |
| OTHER | | |
| OTHER | | |

CEMENT DATA

| STAGE | NUMBER OF SACKS | CEMENT | BRAND | BULK SACKED | ADDITIONS | YIELD CU FT/SK. | MIXED LBS/GAL |
|-------|-----------------|--------|-------|-------------|------------------------|-----------------|---------------|
| | | | | | 4000 water with HUN. 6 | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

PRESSURES IN PSI

| | |
|----------------------|-------------------|
| CIRCULATING | DISPLACEMENT |
| BREAKDOWN | MAXIMUM |
| AVERAGE | FRACTURE GRADIENT |
| SHUT-IN: INSTANT | 5-MIN. 15-MIN. |
| HYDRAULIC HORSEPOWER | |
| ORDERED | AVAILABLE USED |
| AVERAGE RATES IN BPM | |
| DISPL. | OVERALL |
| CEMENT LEFT IN PIPE | |
| FEET | REASON |

SUMMARY

VOLUMES

| | |
|------------------------|----------------|
| FRESH: BBL-GAL | TYPE |
| LOAD & BRDN: BBL-GAL | PAD: BBL-GAL |
| TREATMENT: BBL-GAL | DISPL: BBL-GAL |
| CEMENT SLURRY: BBL-GAL | |
| TOTAL VOLUME: BBL-GAL | |
| REMARKS | |
| Customer Keep Chart | |

WORK ORDER CONTRACT
AND PRE-TREATMENT DATAATTACH TO
INVOICE & TICKET NO.

211727.9

DISTRICT H. Ignatius TownDATE 2-5-72

TO: HALLIBURTON SERVICES

YOU ARE HEREBY REQUESTED TO FURNISH EQUIPMENT AND SERVICEMEN TO DELIVER AND OPERATE

THE SAME AS AN INDEPENDENT CONTRACTOR TO: A-M E.

(CUSTOMER)

AND DELIVER AND SELL PRODUCTS, SUPPLIES, AND MATERIALS FOR THE PURPOSE OF SERVICING

WELL NO. 1 LEASE Trans Recycling SEC. _____ TWP. _____ RANGE _____FIELD W.C. COUNTY _____ STATE KY OWNED BY S.

THE FOLLOWING INFORMATION WAS FURNISHED BY THE CUSTOMER OR HIS AGENT -

FORMATION NAME _____ TYPE _____

FORMATION THICKNESS _____ FROM _____ TO _____

PACKER: TYPE _____ SET AT 4150TOTAL DEPTH 1.450 MUD WEIGHT _____

BORE HOLE _____

INITIAL PROD: OIL _____ BPD, H₂O _____ BPD, GAS _____ MCFPRESENT PROD: OIL _____ BPD, H₂O _____ BPD, GAS _____ MCF

| | NEW USED | WEIGHT | SIZE | FROM | TO | MAX. ALLOW P.S.I. |
|--------------|-------------|------------|--------------|-------------|--------------|----------------------|
| CASING | <u>11</u> | <u>20</u> | <u>7</u> | | <u>2450</u> | |
| LINER | <u>11</u> | <u>105</u> | <u>45</u> | <u>2300</u> | <u>4105</u> | |
| TUBING | <u>11</u> | <u>11</u> | <u>2</u> | <u>1370</u> | <u>7130</u> | |
| OPEN HOLE | | | <u>6 1/2</u> | <u>4150</u> | <u>1.450</u> | SHOTS/FT. |
| PERFORATIONS | | | | | | |
| PERFORATIONS | | | | | | |
| PERFORATIONS | | | | | | |

PREVIOUS TREATMENT: DATE _____ TYPE _____ MATERIALS _____

TREATMENT INSTRUCTIONS: TREAT THRU TUBING ☐ ANNULUS ☐ CASING ☐ TUBING/ANNULUS ☐ HYDRAULIC HORSEPOWER ORDERED _____Pressure Test

CUSTOMER OR HIS AGENT WARRANTS THE WELL IS IN PROPER CONDITION TO RECEIVE THE PRODUCTS, SUPPLIES, MATERIALS, AND SERVICES

As consideration, the above-named Customer agrees:

THIS CONTRACT MUST BE SIGNED BEFORE WORK IS COMMENCED

- a) To pay Halliburton in accord with the rates and terms stated in Halliburton's current price list. Invoices are payable NET, by the 20th of the following month after date of invoice. Upon Customer's default payment of Customer's account by the last day of the month following the month in which the invoice is dated, Customer agrees to pay interest thereon after default at the highest lawful contract rate applies but never to exceed 18% per annum. In the event it becomes necessary to employ attorneys to enforce collection of said account, Customer agrees to pay all collection costs and attorney fees in the amount of 20% of the amount of the unpaid account.
- b) To defend, indemnify, release and hold harmless Halliburton, its divisions, subsidiaries, parent and affiliated companies and the officers, directors, employees, agents and servants of all of them from and against any claims, liability, expenses, attorneys fees, and costs of defense to the extent permitted by law for:
- Damage to property owned by, in the possession of, or leased by Customer, and/or the well owner (if different from Customer), including, but not limited to, surface and subsurface damage. The "well owner" shall include working and royalty interest owners.
 - Reservoir, formation, or well loss or damage, subsurface trespass or any action in the nature thereof.
 - Personal injury or death or property damage (including, but not limited to, damage to the reservoir, formation or well), or any damages whatsoever, growing out of or in any way connected with or resulting from pollution, subsurface pressure, losing control of the well and/or a well blowout or the use of radioactive material.
- The defense, indemnity, release and hold harmless obligations of Customer provided for in this Section b) and Section c) below shall apply to claims or liability even if caused or contributed to by Halliburton's negligence, strict liability, or the unseaworthiness of any vessel owned, operated, or furnished by Halliburton or any defect in the data, products, supplies, materials, or equipment of Halliburton whether the preparation, design, manufacture, distribution, or marketing thereof, or from a failure to warn any person of such defect. Such defense, indemnity, release and hold harmless obligations of Customer shall not apply where the claims or liability are caused by the gross negligence or willful misconduct of Halliburton. The term "Halliburton" as used in said Sections b) and c) shall mean Halliburton, its divisions, subsidiaries, parent and affiliated companies, and the officers, directors, employees, agents and servants of all of them.
- c) That because of the uncertainty of variable well conditions and the necessity of relying on facts and supporting services furnished by others, Halliburton is unable to guarantee the effectiveness of the products, supplies or materials, nor the results of any treatment or service, nor the accuracy of any chart interpretation, research analysis, job recommendation or other data furnished by Halliburton. Halliburton person will use their best efforts in gathering such information and their best judgment in interpreting it, but Customer agrees that Halliburton shall not be liable for and Customer shall indemnify Halliburton against any damages arising from the use of such information.
- d) That Halliburton warrants only title to the products, supplies and materials and that the same are free from defects in workmanship and materials. THERE ARE NO WARRANTIES, EXPRESS OR IMPLIED OF MERCHANTABILITY, FITNESS OR OTHERWISE WHICH EXTEND BEYOND THOSE STATED IN THE IMMEDIATELY PRECEDING SENTENCE. Halliburton's liability and Customer's exclusive remedy in the event of action (whether in contract, tort, breach of warranty or otherwise) arising out of the sale or use of any products, supplies or materials is expressly limited to the replacement of such products, supplies or materials on their return to Halliburton or, at Halliburton's option, to the allowance to the Customer of credit for the cost of such items. In no event shall Halliburton be liable for special, incidental, or punitive or consequential damages.
- e) That Customer shall, at its risk and expense, attempt to recover any Halliburton equipment, tools or instruments which are lost in the well and if such equipment, tools or instruments are not recovered, Customer shall pay Halliburton its replacement cost unless such loss is due to the sole negligence of Halliburton. If Halliburton equipment, tools or instruments are damaged in the well, Customer shall pay Halliburton the lesser of its replacement cost or the cost of repairs unless such damage is caused by the sole negligence of Halliburton. In the case of equipment, tools or instruments for marine operations, Customer shall, in addition to the foregoing, be fully responsible for loss of or damage to any of Halliburton's equipment, tools or instruments which occurs at any time after delivery to Customer at the landing or returned to the landing, unless such loss or damage is caused by the sole negligence of Halliburton.
- f) To waive the provisions of the Deceptive Trade Practices - Consumer Protection Act, to the extent permitted by law.
- g) That this contract shall be governed by the law of the state where services are performed or materials are furnished.
- h) That Halliburton shall not be bound by any changes or modifications in this contract, except where such change or modification is made in writing by a duly authorized executive officer of Halliburton.

I HAVE READ AND UNDERSTAND THIS CONTRACT AND REPRESENT
THAT I AM AUTHORIZED TO SIGN THE SAME AS CUSTOMER'S AGENT.

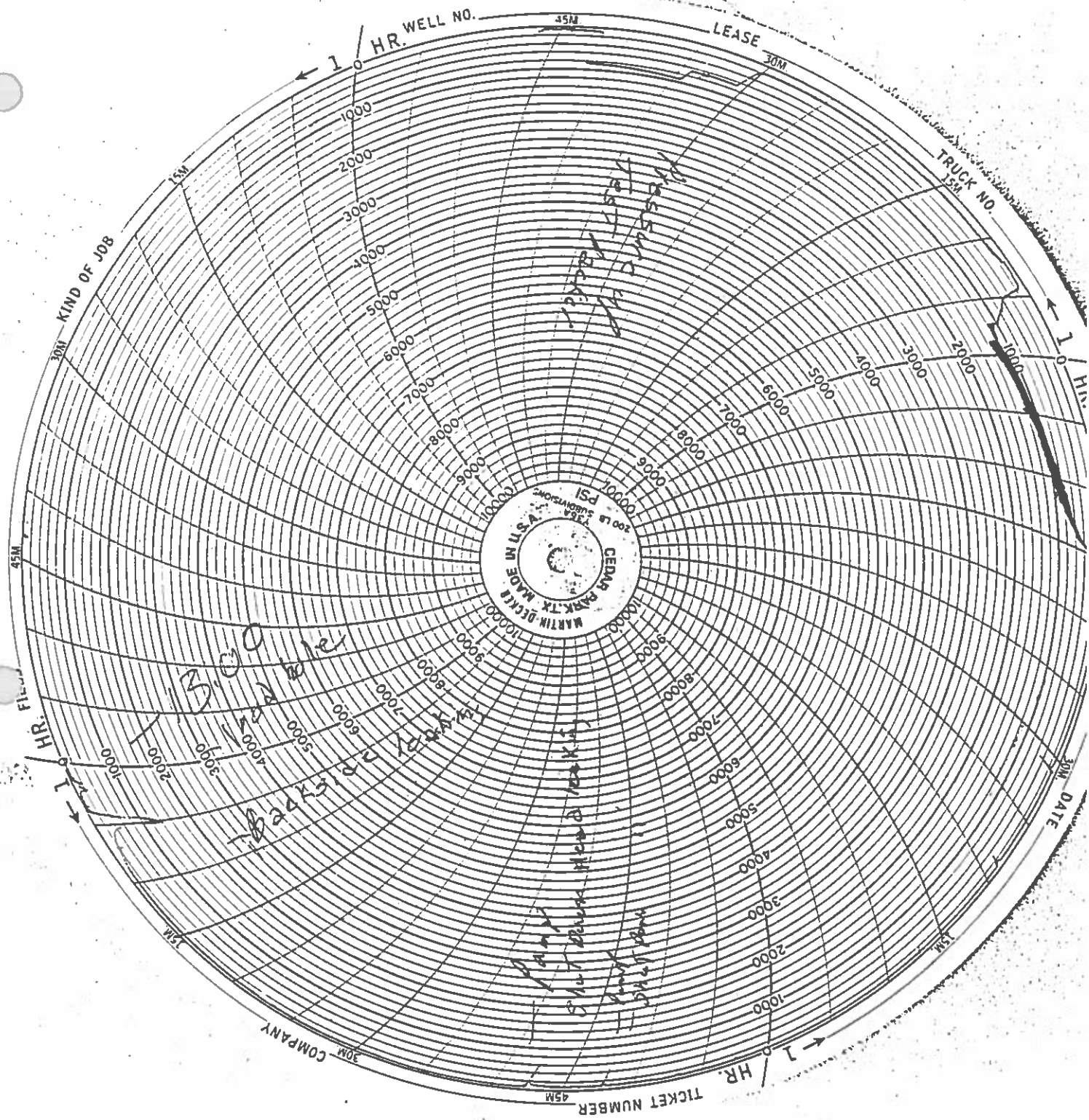
SIGNED _____

DATE 2-5-72

CUSTOMER

We certify that the Fair Labor Standards Act of 1938, as amended, has been complied with in the
production of goods and/or with respect to services furnished under this contract.TIME 12:30 A.M. P.M.

CUSTOMER





COY & MCCOY ENVIRONMENTAL CONSULTANTS, INC.
A SUBSIDIARY OF MCCOY & MCCOY, INC.

UIC MECHANICAL INTEGRITY TEST



Region IV Water Supply Branch
345 Courtland St. NE
Atlanta, Georgia 30385
Phone (404)347-3866

WELL IDENTIFICATION

| | |
|---|---|
| OPERATOR <u>IMCO Recycling, Inc.</u> | EPA KYS NO. <u>KYS0310117</u> |
| ADDRESS <u>1503-1511 North 8th Street</u> | LEASE NAME <u>IMCO Well #1</u> |
| <u>Sapulpa, OK 74066</u> | WELL NO. <u>IMCO Well #1</u> |
| PHONE <u>(918) 665-6575</u> | STATE PERMIT NO. <u>81179</u> POOL <u>N/A</u> |
| 2340 FSL: <u>160</u> FEL: <u>14</u> I <u>34</u> | STATE NAME/CODE <u>(KY/21) TN/47</u> (circle one) |
| | COUNTY NAME <u>Butler</u> COUNTY CODE <u>031</u> |

WELL COMPLETION

| | | | | |
|---------------------------|---------------------------------------|---|----------------------------------|--|
| WELL TYPE (code) <u>1</u> | TOTAL DEPTH <u>6457</u> (ft) | SURFACE ELEVATION <u>445.6</u> (ft MSL) | | |
| CASING STRING | CASING DIAMETER (inches) | CEMENT SHOE DEPTH | CEMENT VOLUME (sacks/type) | PACKER TYPE <u>Baker R-3 Double-grip</u> |
| Surface | <u>9 5/8"</u> | <u>471</u> | <u>300 / A'</u> | PACKER DEPTH <u>4690.83</u> (ft) |
| Intermediate | <u>7"</u> | <u>2542</u> | <u>450 / A'</u> | MAX. INJECTING PRES. <u>2700</u> (psi) |
| Production | <u>4 1/2"</u> | <u>2300-4703</u> | <u>650 / A'</u> | EST. FRACTURE PRES. <u>3300 +</u> (psi) |
| Tubing | <u>3 1/2"</u> | <u>0-2247</u> | | PERFORATIONS @ <u>Open Hole</u> (ft) |
| | <u>2 7/8"</u> | <u>2247-4690</u> | | |
| CONFINING FORMATION | NAME <u>New Albany to top of Knox</u> | LOWERMOST USDW | FORMATION NAME <u>Penn. sand</u> | |
| | TOP ELEVATION <u>2330</u> (MSL) | | BASE ELEVATION <u>250</u> (MSL) | |
| | THICKNESS <u>2370</u> (ft) | INJECTION FORMATION | FORMATION NAME <u>Knox</u> | |
| | | | TOP ELEVATION <u>4700</u> (MSL) | |

MIT TEST DATA

| | |
|---|--------------------------------|
| TEST DATE <u>10/9/92</u> | INJECTED FLUID _____ Sg _____ |
| EXTERNAL MIT- CEMENT RECORD <input checked="" type="checkbox"/> LOGS <input type="checkbox"/> | ANNULAR FLUID _____ Sg _____ |
| TYPE OF TEST <input checked="" type="checkbox"/> SHUT-IN (check one) | INJECTION RATE _____ (bbl/day) |
| | INJECTION PRESSURE _____ (psi) |

ANNULAR PRESSURE TEST

| | | | |
|-----------------------------|---------------------------|---------------------------|--------------------------|
| INITIAL TEST PRESSURE (psi) | FINAL TEST PRESSURE (psi) | PRESSURE CHANGE (-/+ psi) | LENGTH OF TEST (MINUTES) |
| ANNULAR SPACE <u>309</u> | <u>303</u> | <u>-6</u> | <u>30</u> |

COMMENTS

9 5/8" T.O.C. @ surface; 7" T.O.C. @ surface; 4 1/2" - cemented.

OPERATOR REPRESENTATIVE Dan Trimmer UIC INSPECTOR David M. Ollman

TSA Inc.

NOTICE OF ROUTINE INSPECTION

EPA

| INSPECTION CONTRACTOR | FIRM TO BE INSPECTED | ADDRESS (EPA REGIONAL OFFICE) |
|--|---|---|
| TSA, Inc. 598 College St. Winchester, KY 40391 606-737-3641 | NAME <u>INCO Recycling, Inc.</u> ADDRESS <u>15000 Highway 101, Box 17261-P10</u> TELEPHONE <u>(502) 526-5658</u> | Environmental Protection Agency Region IV 100 Alabama St. SW Atlanta, Georgia 30303 404-562-9424 |

This document constitutes written notice pursuant to 42 U.S.C. §300j-4(b)(1) of inspection by duly authorized personnel of the U.S. Environmental Protection Agency of this facility noted below

REASON FOR INSPECTION

The purpose of inspection is to determine whether the person (including any corporation or partnership) subject to any applicable underground injection control program has acted or is acting in compliance with The Safe Drinking Water Act and all regulations promulgated thereunder, including underground injection control (UIC) regulations and any applicable rule.

| Lease Name / Well No | EPA ID NO. | Location | Well Status | Comments |
|----------------------|---------------------------------------|-----------------------------------|---------------------------------------|----------|
| INCO #1 | KYS <u>0310117</u> KYI <u>0429</u> | <u>14-E-34</u> FNL FSL FEL FWL | Active Shut In Temp Abdn P&A | |
| | KYS _____ KYI _____ | FNL FSL FEL FWL | Active Shut In Temp Abdn P&A | |
| | KYS _____ KYI _____ | FNL FSL FEL FWL | Active Shut In Temp Abdn P&A | |
| | KYS _____ KYI _____ | FNL FSL FEL FWL | Active Shut In Temp Abdn P&A | |
| | KYS _____ KYI _____ | FNL FSL FEL FWL | Active Shut In Temp Abdn P&A | |
| | KYS _____ KYI _____ | FNL FSL FEL FWL | Active Shut In Temp Abdn P&A | |

Section 1445(b) of the SDWA (42 U.S.C. §300j-4 (b)) is quoted on the reverse of this form.

Additional Comments

Receipt of this Notice of Routine Inspection is hereby acknowledged

| FIRM REPRESENTATIVE | DATE | INSPECTOR (TSA, Inc.) |
|---------------------|-----------------|-----------------------|
| <u>[Signature]</u> | <u>10-15-97</u> | <u>[Signature]</u> |

TSA Inc. NOTICE OF INSPECTION EPA

| | | |
|--|--|---|
| INSPECTION CONTRACTOR TSA, Inc. 598 College St. Winchester, KY 40391 (606) 737-3641 | FIRM TO BE INSPECTED <i>IMCO Recycling</i> | ADDRESS (EPA REGIONAL OFFICE) Environmental Protection Agency Region IV 100 Alabama St. SW Atlanta, Georgia 30303 (404) 562-9424 |
|--|--|---|

This document constitutes written notice pursuant to 42 U.S.C. § 300j-4 (b)(f) of inspection by duly authorized personnel of the U.S. Environmental Protection Agency of this facility noted below.


REASON FOR INSPECTION

The purpose of inspection is to determine whether the person (including any corporation or partnership) subject to any applicable underground injection control program has acted or is acting in compliance with The Safe Drinking Water Act and all regulations promulgated thereunder, including underground injection control (UIC) regulations and any applicable permit or rule.

IMCO #1 0310117

Section 1445 of the SDWA (42 U.S.C. § 300j-4 (b)) is quoted on the reverse of this form

Receipt of this Notice of Inspection is hereby acknowledged.

| | | |
|---|--------------------------------|---|
| OPERATOR REPRESENTATIVE <i>Charles H. [Signature]</i> | DATE <i>10-20-87</i> | INSPECTOR (TSA, INC.)  |
|---|--------------------------------|---|

TSA Inc.

UIC MECHANICAL INTEGRITY TEST

EPA

Region IV Water Supply Branch
100 Alabama St. SW
Atlanta, GA 30303
Phone (404) 562-9424

WELL IDENTIFICATION

OPERATOR TMC Recycling Inc. EPA ID NO. 0310117
ADDRESS 609 Greener Camp Rd ^{PO BOX 1010} LEASE / WELL NO. TMC #1
1102541-001 Key 4261-1010 STATE PERMIT NO. 81179 POOL 1A
PHONE NO. (507) 526-5658 DOW TANK BATTERY REG NO. NA
2340 160 FEL FWI 14 I-34 LATITUDE _____ LONGITUDE _____
(FSL)

WELL COMPLETION

WELL TYPE(CODE) 2- _____ TOTAL DEPTH 6457 (ft) SURFACE ELEVATION 445.6 (ft msl)

| CASING STRING | CASING DIAMETER (inches) | CEMENT SHOE DEPTH | CEMENT VOLUME (sacks / type) | TOP OF CEMENT | TOC CALCULATED FROM |
|---------------|--------------------------|-------------------|------------------------------|---------------|---|
| SURFACE | <u>4 5/8</u> | <u>471</u> | <u>300 Sx A</u> | <u>SFC</u> | RECORDS <input checked="" type="checkbox"/> |
| INTERMEDIATE | <u>7</u> | <u>2542</u> | <u>450 Sx A</u> | <u>SFC</u> | CBL <input checked="" type="checkbox"/> |
| PRODUCTION | <u>4 1/2</u> | <u>2300-4703</u> | <u>600 Sx A</u> | <u>2300</u> | REMEDIAL <input type="checkbox"/> |
| TUBING | <u>2 1/2</u> | <u>0-2247</u> | | | |

PACKER TYPE 2 1/2" R-2 FORMATION NAME Flint
PACKER DEPTH 4690.53 INJECTION FORMATION TOP ELEVATION 4700
PERFORATIONS OH

OPERATIONAL DATA

INJECTED FLUID 2.0 ml INJECTION RATE _____ (bbl/day)
ANNULAR FLUID 1H Water INJECTION PRESSURE _____ (psi)

WELL STATUS ☐ SHUT IN ☐ SINCE _____ TYPE ☐ CASING INJECTOR ☐
☒ ACTIVE ☒ TUBING AND PACKER

ANNULAR PRESSURE TEST

| ANNULAR SPACE | INITIAL TEST PRESSURE (psi) | FINAL TEST PRESSURE (psi) | PRESSURE CHANGE (+/- psi) | LENGTH OF TEST (minutes) |
|---------------|-----------------------------|---------------------------|---------------------------|--------------------------|
| | <u>240</u> | <u>240</u> | <u>0</u> | <u>30</u> |

N/A = INFORMATION NOT AVAILABLE COMMENTS _____

OPERATOR REPRESENTATIVE

Charlie St...

DATE

11-28-97

UIC INSPECTOR (TSA Inc.)

[Signature]



ATTACHMENT M CONSTRUCTION DETAILS

Subsurface:

The construction details are discussed in Attachment L and are shown on Figure L-1.

Wellhead:

Figure M-1 shows the details of wellhead construction.

Surface Facilities:

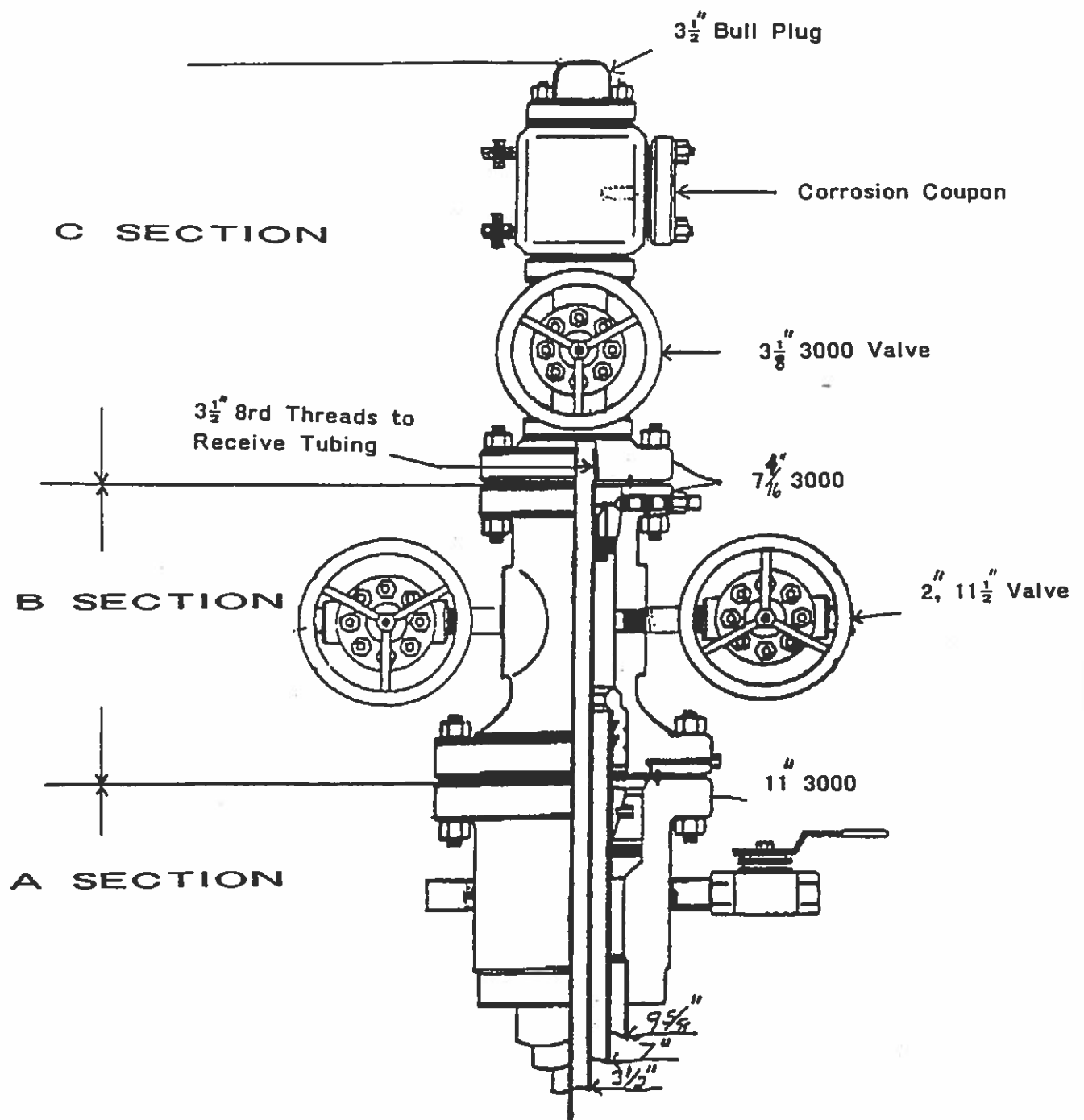
Surface facilities include fluid suction system, filtration system and injection pumping system. The surface facilities (filtration, injection pumping and wellhead systems are enclosed in a building.

Suction System - The suction system consists of two 2-horsepower Teel Model 1P897 centrifugal pumps, each with separate intake screens located in the pond. Detail drawing of suction system is shown on Figure M-2. The suction system is also equipped with backwash system.

Filtration System - The filtration system consists of two Tritan Model TR 140 sand filters with a filter size of 50 microns and greater. Each filter unit is rated at 140 gallons per minute and can be operated independently or together. The system also has backwash capability. The filtration system and suction system are connected with 3" plastic pipe of approximately 450 feet in length. Detail drawing of filtration system is shown on Figure M-3.

Injection Pumping and Monitoring System - The filter system and the injection pump at the wellhead are connected together with 3-inch diameter steel supported rubber hoseline. The injection pump consists of a Wheatley Triplex Plunger pump. The flow rate with a 6.5-inch sheave on the drive motor is 65 gpm. The pump discharge pressure is regulated by a Hydro-Seal pressure relief valve adjustable from 500 psig to 2,000 psig. The bypassed or relief fluid flows through a separate 2-inch plastic line back to the pond. The system is designed to operate at 1,750 psig or less due to the horsepower limitation of the drive motor.

The drive motor is an electric 3-phase 460-volt ac 100 horsepower motor with a 405T



A & M ENGINEERING AND
ENVIRONMENTAL SERVICES, INC.

ENGINEERING - ENVIRONMENTAL - CONSTRUCTION

WELLHEAD

SCALE:

DATE:

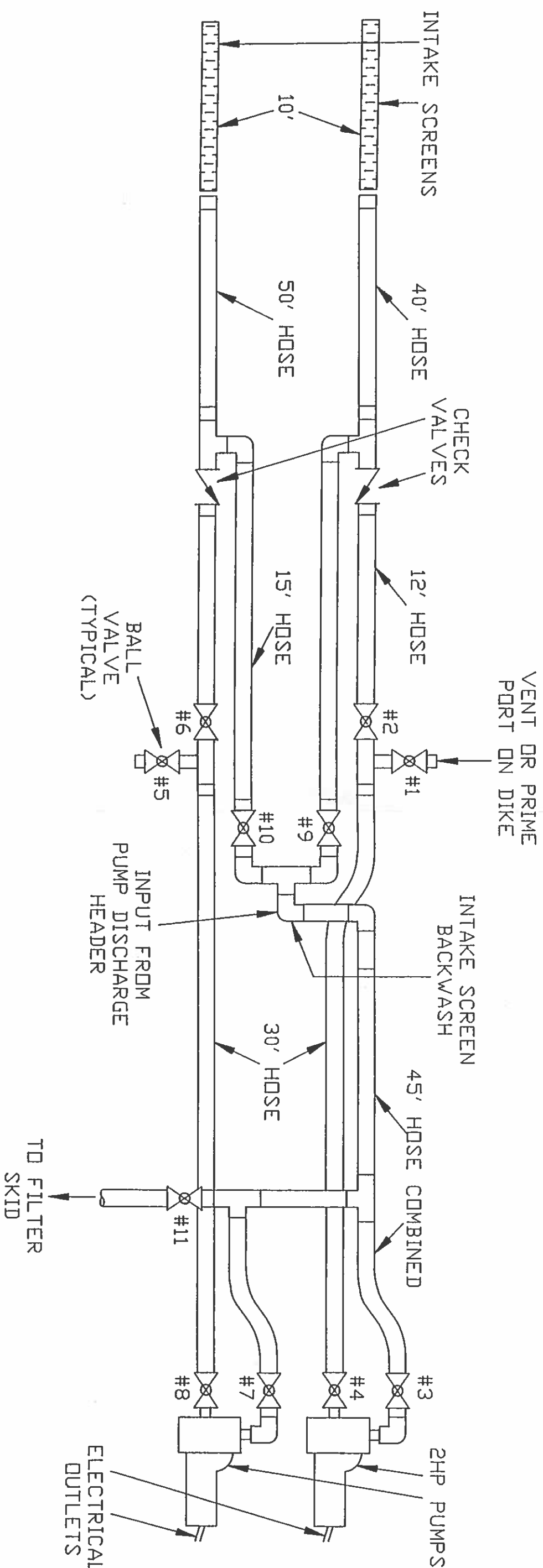
FIGURE NO.

M-1

APPROVED BY:

DRAWN BY:

DRAWING NO.



GENERAL NOTES

ALL HOSES ARE 4" IN DIAMETER.

| NO. | DESCRIPTION | BY | CHECKED | DATE | NO. | DESCRIPTION | BY | CHECKED | DATE |
|-----|-------------|----|---------|------|-----|-------------|----|---------|------|
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A & M ENGINEERING AND
ENVIRONMENTAL SERVICES, INC.

ENGINEERING - SURVEILLANCE - CONSULTING

| | | | | |
|--------|------------|------|------|------|
| DESIGN | CHECKED BY | DATE | DATE | DATE |
| | | | | |

IMCD KENTUCKY PRIMING
POND PUMP SUCTION
FIGURE M-2

| | | | |
|-------------|-------|----------------|----------------|
| APPROVED BY | SCALE | PROJECT NUMBER | ISSUING NUMBER |
| | | | |

NTS 1226

REV 1

frame. The starter is a reduced voltage starter for reducing the surge in the power grid. The motor is thermally protected by the starter from overload.

Suction pressure of 10 psig or greater is required to start the injection motor. The suction pressure is monitored by a Dresser/Ashcroft Model B424B normally open pressure switch and one pen of a PMC Model 212-2 seven-day dual pen chart recorder.

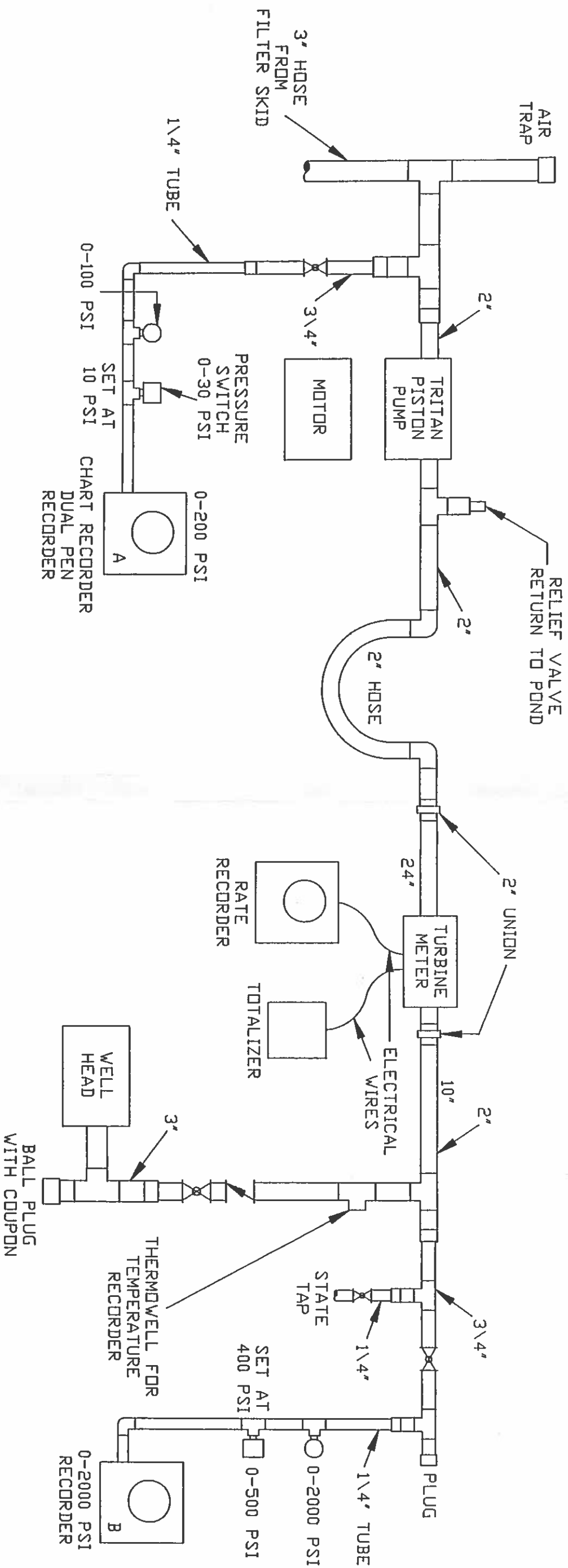
The discharge pressure which is the same as the injection pressure is monitored by the other pen in the PMC recorder and a Dresser/Ashcroft Model B424B normally pressure switch set at 400 psig. The chart pressure range is from 0 to 2,000 psig. The pressure switch closes when the discharge pressure rises above 400 psig which is only used when the system is in automatic. In the manual mode, the discharge pressure switch is not in the control circuit.

A 2-inch Daniels Model CR turbine meter is used to measure the flow of fluid into the injection well. A Daniels Model 2403 battery powered totalizer is used to maintain the records of how many gallons of fluid have been injected into the well. The system works by the turbine blades located in the stream of fluid rotating past a magnet which produces up an electric signal each time a turbine blade passes the magnet. The totalizer counts the electric pulses and converts these into gallons. Specifically, each gallon produces 116 pulses with the 2-inch flow meter. This dividing number is manually set into a register in the totalizer.

The same pulses are fed parallel into a Transpak Frequency Input Isolating Two Wire Transmitter Model T671 and converted into a 4 to 20-milliamp signal. With no flow, the signal is 4 milliamps and with 100 gpm, the signal is 20 milliamps. This signal is fed into a Partlow Model ARC 4100 seven-day chart recorder to provide a recording of the instantaneous flow rate into the injection well.

The injection fluid temperature is monitored by a C.E. Invalco Pressure/Temperature recorder. The temperature range is from 0 to 150 degrees F.

Detail drawing of the system is shown on Figure M-4.



GENERAL NOTES

| NO. | DESCRIPTION | BY | CHECKED | DATE | NO. | DESCRIPTION | BY | CHECKED | DATE |
|-----|-------------|----|---------|------|-----|-------------|----|---------|------|
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A & M ENGINEERING AND
ENVIRONMENTAL SERVICES, INC.

DESIGNING - ENVIRONMENTAL - CONSTRUCTION

| DATE | DATE | DATE | DATE | DATE | DATE |
|------|------|------|------|------|------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Injection and Monitoring System
IMCO Injection Well
Morgantown, Kentucky
Figure M-4

| DATE | DATE | DATE | DATE | DATE | DATE |
|------|------|------|------|------|------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

SCALE PROJECT NUMBER DRAWING NUMBER
NTS 1226

WELL



ATTACHMENT N
NOT APPLICABALE

ATTACHMENT O PLANS FOR WELL FAILURES

Emergency procedures for the IMCO injection well are simplified by:

- 1) the fact that no hazardous fluids will be injected, and
- 2) high pressure and low-pressure switches are installed in the system.

The pressure switches are connected to the actuator and to the injection pump and the suction pump. In case of emergency (higher pressure or lower pressure than normal operation pressure), the pressure switches will actuate the actuator to close the ball valve at the wellhead and turn off the pumps to stop fluid suction from the pond and stop fluid injection. When the injection pump and the suction pump shut off, no injection fluid will be transported from the retention pond to the injection well. Thus, a spill amount will be very limited.

In the event of an emergency involving a spill in the vicinity of the suction and filter system, the wellhead or along the hose, the first response shall be containment of lost non-hazardous fluid in a diked and lined area around the source of the spill. Then this lost non-hazardous fluid will be returned to the pond for reinjection by placing a small portable pump equipped with flexible hose. In such situations, IMCO will notify the U.S. EPA Region IV Groundwater Division, UIC Section within 24 hours of occurrence (404-562-9900).

Repair work shall commence as soon as emergency clean-up procedures are complete. A report will be prepared and submitted to U.S. EPA Region IV.



ATTACHMENT P MONITORING PROGRAM

Monitoring represents the feed back mechanism which defines the success of the project and quickly identifies developing problems. During well operation, IMCO Recycling Inc. monitors quality of injected fluid, injection pressure, injection temperature, annulus pressure and flow rate. The monitoring results are reported quarterly to U.S. Environmental Protection Agency, Region IV.

Also, every five years a mechanical integrity test of the well will be conducted and the results of the test will be reported to U.S. EPA, Region IV.

Quality of Injected Fluid:

Since the only fluid to be injected is the leachate (salt water) from the landfill and contaminated runoff water from the IMCO facility, no major changes are expected in chemical and physical characteristics of the injection fluid. Sampling of injection fluid will be on a quarterly basis. A grab sample will be obtained from the retention pond and submitted to a qualified laboratory for analysis. The sample will be analyzed for the following parameters:

| | |
|-------------------------|-------------------------|
| pH✓ | specific gravity✓ |
| sulfate✓ | barium✓ |
| calcium✓ | total iron✓ |
| sodium✓ | bicarbonate✓ |
| carbonate✓ | ammonia |
| chlorides✓ | magnesium✓ |
| aluminum✓ | cadmium✓ |
| lead✓ | total suspended solids✓ |
| total dissolved solids✓ | carbon dioxide✓ |
| dissolved oxygen✓ | hydrogen sulfide✓ |

Results of laboratory analysis will be submitted to U.S. EPA. Region IV with the quarterly report.

Injection Pressure:

The injection pressure is monitored continuously through a recorder placed at the wellhead. In each quarterly report the highest, average and the lowest injection pressures will be reported for each month.

Injection Temperature:

The temperature of the injection fluid will be monitored continuously and will be recorded on the chart. In each quarterly report the minimum, average and the maximum temperatures will be reported for each month.

Annulus Pressure

The annulus of the injection well is maintained at a minimum positive pressure of 10 psig at the wellhead. Then the annulus pressure of the injection well will be monitored continuously on a pressure recorder. In each quarterly report the minimum, average and the maximum annulus pressure will be reported for each month.

Flow Rate:

The flow into the IMCO injection well is continuously monitored with a totalizer that is set in the injection line. The totalizer is a digital flow meter that records the total flow in. The totalizer readings are done daily so that the daily flow rate can be calculated from the daily flow in. Table P-1 shows the daily record sheet that is used at the IMCO injection well. Also, a flow rate recorder is installed to continuously record the flow rate on the chart. In each quarterly report the minimum, average and the maximum flow rates will be reported each month.

Record Keeping:

The pressures, temperature and flow rate recorder charts and the daily record sheets are kept on file for five years and are open for inspection. After five years they may be disposed.

OPERATION PERMIT NO.

DAILY RECORD SHEET

[illegible]

TABLE P-1

**ATTACHMENT Q
PLUGGING AND ABANDONMENT PLAN**

Through tubing, a plug will be set in the landing nipple below the 4 1/2" x 2 7/8" packer. The 2 7/8" and 3 1/2" tubing will be released from the packer and pulled out of the well. The 4 1/2" casing will be tested with 10 lbs/gallon brine plus 500 psig. Tubing will be run and the well will be cemented from 4703 feet to 2200 feet depth with approximately 500 sacks of sulfate resistant cement. The remaining part of the well (2200 to 40 feet depth) will be filled with mud and a cement plug will be installed at the top. The wellhead will be removed and a marker containing the date of plugging and permit number will be installed.

U.S. EPA, Region IV will be notified of the exact time during which plugging operation will take place.

The cost of plugging and abandonment is estimated at \$10,000 in 2001 dollars. See Attachment R for the assurance and availability of the resources for this cost.



ATTACHMENT R
NECESSARY RESOURCES

Enclosed is an irrevocable standby letter of credit to assure availability of resources.

AMERICAN NATIONAL Bank and Trust Company

P. O. BOX 1408, SAPULPA, OKLAHOMA 74066 • 918/234-3210



GUY L. BERRY III,
PRESIDENT AND
CHIEF OPERATIONS OFFICER

May 3, 1990

Regional Administration
Environmental Protection Agency Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Sir or Madam:

We hereby establish our Irrevocable Standby Letter of Credit No. 523 in your favor, at the request and for the account of IMCO Recycling, Inc., P. O. Box 1070, Sapulpa, Oklahoma 74067 up to the aggregate amount of Ten Thousand and No/100 U. S. Dollars (\$10,000.00), available upon presentation of:

1. Your sight draft, bearing reference to this letter of credit No. 523, and
2. Your signed statement reading as follows: "I certify that the amount of the draft is payable pursuant to regulations issued under authority of the Safe Drinking Water Act."

This letter of credit is effective as of May 15, 1990, and shall expire on May 15, 1991, but such expiration date shall be automatically extended for a period of at least one year on May 15, 1991 and each successive expiration date, unless, at least 120 days before the current expiration date, we notify both you and IMCO Recycling, Inc. by certified mail that we have decided not to extend this letter of credit beyond the current expiration date. In the event you are so notified, any unused portion of the credit shall be available upon presentation of your sight draft for 120 days after the date of receipt by both you and IMCO Recycling, Inc., as shown on the signed return receipts.

Whenever this letter of credit is drawn on under and in compliance with the terms of this credit, we shall duly honor such draft upon presentation to us, and we shall deposit the amount of the draft directly into the standby trust fund of IMCO Recycling, Inc. in accordance with your instructions.

This Letter of Credit is subject to the most recent edition of the Uniform Customs and Practice for Documentary Credits, published by the International Chamber of Commerce Publication No. 400, (1983 Revision).

Yours truly,

GUY L. BERRY, III
President and
Chief Operation Officer

GLB/ka

Attachment to Irrevocable Standby Letter of Credit No. 523.
Identification of Facilities and Cost Estimates

Owner or Operator: IMCO Recycling, Inc.

American National Bank and Trust Company of Sapulpa, Oklahoma

Name of facility

IMCO Recycling, Inc.

Address of facility

609 Gardner Camp Road
Highway 1468
Morgantown, Kentucky 42261

Current plugging and
abondment cost estimate

\$10,000.00

Date of estimate

May 2, 1990



A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

3840 S. 103RD E. AVENUE
TULSA, OK 74146

ENGINEERING - ENVIRONMENTAL - CONSTRUCTION
(918) 665-6575

July 10, 1990

Mr. William Mann
UIC Section
Groundwater Protection Branch
U.S. EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia, 30365

Re: IMCO Injection Well Permit Application KYI0429

Dear Mr. Mann:

Please find enclosed the properly executed "Standby Trust Agreement" for the above mentioned application. I believe, with this form, the application requirements are completed. I understand that after issuing the draft permit, your department will be publishing the "Public Notice".

Thank you for your help, and if there is anything we can do to speed up the process, please let me know.

Very truly yours,

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

Irfan Taner
Geologist

Enclosure

IT:bam

xc: Tom Rogers
Dick Kerr

STANDBY TRUST AGREEMENT

U.S. Environmental Protection Agency
Underground Injection Control
Financial Responsibility Requirement

TRUST AGREEMENT, the "Agreement," entered into as of May 15, 1990 by and between IMCO Recycling Inc., a Delaware Corporation, the "Grantor," and American National Bank and Trust Company of Sapulpa, Oklahoma, a national bank, the "Trustee."

WHEREAS, the United States Environmental Protection Agency, "EPA," an agency of the United States Government, has established certain regulations applicable to the Grantor, requiring that an owner or operator of an injection well shall provide assurance that funds will be available when needed for plugging and abandonment of the injection well, and

WHEREAS, the Grantor has elected to obtain a letter of credit and establish a standby trust to provide all or part of such financial assurance for the facility identified herein, and

WHEREAS, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this Agreement, and the Trustee is willing to act as trustee,

NOW THEREFORE, the Grantor and the Trustee agree as follows:

Section 1. Definitions. As used in this Agreement:

(a) The term "Grantor" means the owner or operator who enters into this Agreement and any successors or assigns of the Grantor.

(b) The term "Trustee" means the Trustee who enters into this Agreement and any successor Trustee.

(c) "Facility" or "activity" means any underground injection well or any other facility or activity that is subject to regulation under the Underground Injection Control Program.

Section 2. Identification of Facilities and Cost Estimates. This Agreement pertains to the facilities and cost estimates identified in Schedule A (attached). (Schedule A lists, for each facility, the EPA identification number, name, address, and the current plugging and abandonment cost estimate, or portions thereof, for which financial assurance is demonstrated.)

Section 3. Establishment of Fund. The Grantor and the Trustee hereby establish a trust fund, the "Fund," for the benefit of EPA. The Grantor and the Trustee intend that no third party have access to the Fund except as herein provided. The Fund is established initially as consisting of the property, which is acceptable to the Trustee, described in Schedule B attached hereto. Such property and any other property subsequently transferred to the Trustee is referred to as the Fund, together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, IN TRUST, as hereinafter provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount or adequacy of, nor any duty to collect from the Grantor, any payments necessary to discharge any liabilities of the Grantor established by EPA.

Section 4. Payment for Plugging and Abandonment. The Trustee shall make payments from the Fund as the EPA Regional Administrator shall direct, in writing, to provide for the payment of the costs of plugging and abandonment of the injection wells covered by this Agreement. The Trustee shall reimburse the Grantor or other persons as specified by the EPA Regional Administrator from the Fund for plugging and abandonment expenditures in such amounts as the EPA Regional Administrator shall direct in writing. In addition, the Trustee shall refund to the Grantor such amounts as the EPA Regional Administrator specifies in writing. Upon refund, such funds shall no longer constitute part of the Fund as defined herein.

Section 5. Payments Comprising the Fund. Payments made to the Trustee for the Fund shall consist of cash or securities acceptable to the Trustee.

Section 6. Trustee Management. The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the Grantor may communicate in writing to the Trustee from time to time, subject, however, to the provisions of the Section. In investing, reinvesting, exchanging, selling, and managing the Fund, the Trustee shall discharge his duties with respect to the trust fund solely in the interest of the beneficiary and with the care, skill, prudence, and diligence under the circumstances then prevailing, which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with the aims, except that:

(a) Securities or other obligations of the Grantor, or any other owner or operator of the facilities, or any of their affiliates as defined in the Investment Company Act of 1940, as amended, 15 USC 80a-2.(a), shall not be acquired or held, unless they are securities or other obligations of the Federal or a State government;

(b) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the Federal or State government; and

(c) The Trustee is authorized to hold cash awaiting investment or distribution uninvested for a reasonable time and without liability for the payment of interest thereon.

Section 7. Commingling and Investment. The Trustee is expressly authorized in its discretion:

(a) To transfer from time to time any or all of the assets of the Fund to any common, commingled, or collective trust fund created by the Trustee in which the fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and

(b) To purchase shares in any investment company registered under the Investment Company Act of 1940, 15 U.S.C. 80a-1 et seq., including one which may be created, managed, underwritten, or to which investment advice is rendered or the shares of which are sold by the Trustee. The Trustee may vote such shares in its discretion.

Section 8. Express Powers of Trustee. Without in any way limiting the powers and discretions conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered.

(a) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale. No person dealing with the Trustee shall be bound to see to the application of the purchase money or to inquire into the validity or expediency of any such sale or other disposition;

(b) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;

(c) To register any securities held in the Fund in its own name or in the name of a nominee and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in other fiduciary capacities, or to deposit or arrange for the deposit of any securities issued by the United States Government, or any agency or instrumentality thereof, with a Federal Reserve bank, but the books and records of the Trustee shall at all times show that all such securities are part of the Fund;

(d) To deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the Federal or State government; and

(e) To compromise or otherwise adjust all claims in favor of or against the Fund.

Section 9. Taxes and Expenses. All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of this Trust, including fees for the legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor, and all other proper charges and disbursements of the Trustee, shall be paid from the Fund.

Section 10. Annual Valuation. Commencing after initial funding of the trust, the Trustee shall annually, at least 30 days prior to the anniversary date of establishment of the Fund, furnish to the Grantor and to the appropriate EPA Regional Administrator a statement confirming the value of the Trust. Any securities in the Fund shall be valued at the market value as of no more than 60 days prior to the anniversary date of establishment of the Fund. The failure of the Grantor to object in writing to the Trustee within 90 days after the statement has been furnished to the Grantor and the EPA Regional Administrator shall constitute a conclusively binding assent by the Grantor, barring the Grantor from asserting any claim or liability against the Trustee with respect to matters disclosed in the statement.

Section 11. Advice of Counsel. The Trustee may from time to time consult with counsel, who may be counsel to the Grantor, with respect to any question arising as to the construction of this Agreement or any action to be taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting upon the advice of counsel.

Section 12. Trustee Compensation. The Trustee shall be entitled to reasonable compensation for its services as agreed upon in writing from time to time with the Grantor.

Section 13. Successor Trustee. The Trustee may resign or the Grantor may replace the Trustee, but such resignation or replacement shall not be effective until the Grantor has appointed a successor trustee and this successor accepts the appointment. The successor trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. Upon the successor trustee's acceptance of the appointment, the Trustee shall assign, transfer, and pay over to the successor trustee the funds and properties then constituting the Fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment

of a successor trustee or for instructions. The successor trustee shall specify the date on which it assumes administration of the trust in a writing sent to the Grantor, the EPA Regional Administrator, and the present Trustee by certified mail 10 days before such change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this Section shall be paid as provided in Section 9.

Section 14. Instructions to the Trustee. All orders, requests, and instruction by the Grantor to the Trustee shall be in writing, signed by such persons as are designated in the attached Exhibit A, or such other designees as the Grantor may designate by amendment to Exhibit A. The Trustee shall be fully protected in acting without inquiry in accordance with the Grantor's orders, requests, and instructions. All orders, requests, and instructions by the EPA Regional Administrator to the Trustee shall be in writing, signed by the EPA Regional Administrator of the Regions in which the facilities are located, or their designees, and the Trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions. The Trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the Grantor or EPA hereunder has occurred. The Trustee shall have no duty to act in the absence of such orders, requests, and instructions from the Grantor and/or EPA, except as provided for herein.

Section 15. Amendment of Agreement. This Agreement may be amended by an instrument in writing executed by the Grantor, the Trustee, and the appropriate EPA Regional Administrator, or by the Trustee and the appropriate EPA Regional Administrator if the Grantor ceases to exist.

Section 16. Irrevocability and Termination. Subject to the right of the parties to amend this Agreement as provided in Section 15, this Trust shall be irrevocable and shall continue until terminated at the written agreement of the Grantor, the Trustee, and the EPA Regional Administrator, or by the Trustee and the EPA Regional Administrator if the Grantor ceases to exist. Upon termination of the Trust, all remaining trust property less final trust administration expenses, shall be delivered to the Grantor.

Section 17. Immunity and Indemnification. The Trustee shall not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this Trust, or in carrying out any directions by the Grantor or the EPA Regional Administrator issued in accordance with this Agreement. The Trustee shall be indemnified and saved harmless by the Grantor or by the Trust Fund, or both from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the Grantor fails to provide such defense.

Section 18. Choice of Law. This Agreement shall be administered, construed, and enforced according to the laws of the State of Oklahoma.

Section 19. Interpretation. As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each Section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement.

IN WITNESS WHEREOF, the parties below have caused this Agreement to be executed by their respective officers duly authorized and the corporate seals to be hereunto affixed and attested as of the date first above written.

IMCO Recycling Inc.

By: *Ralph L. Cheek*
Ralph L. Cheek, President and
Chief Executive Officer

Attest: *Paul V. Dufour*
Sr. Vice President
(Title)

(SEAL)

American National Bank and Trust
Company

By: *Guy L. Berry, III*
Guy L. Berry, III, President and
Chief Operations Officer

Attest: *Lena L. Lumsden*
Paralegal
(Title)

(SEAL)

CERTIFICATE OF ACKNOWLEDGMENT

FOR

STANDBY TRUST FUND AGREEMENT

STATE OF TEXAS

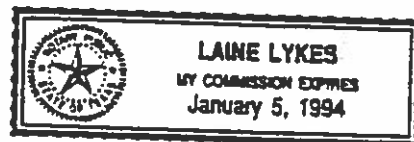
COUNTY OF DALLAS

On this 15th day of May, 1990, before me personally came Ralph L. Cheek to me known, who, being by me duly sworn, did depose and say that he resides at 602 Durango Circle North, Irving, Texas 75062, that he is President and Chief Executive Officer of IMCO Recycling Inc., the corporation described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to such instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said corporation, and that he signed his name thereto by like order.



(Notary Public)

(Seal)



SCHEDULE A

Identification of Facilities and Cost Estimates

Schedule A is referenced in the trust agreement dated May 15, 1990 by and between IMCO Recycling Inc., the "Grantor," and American National Bank and Trust Company the "Trustee."

| | |
|---|--|
| EPA identification number | KYI0429 |
| Name of facility | IMCO Recycling Inc. |
| Address of facility | 609 Gardner Camp Road, Highway 1468, Morgantown, KY 42261 |
| Current plugging and abandonment cost estimate | \$10,000.00 |
| Date of estimate | May 2, 1990 |

SCHEDULE B
IDENTIFICATION OF FUND

Schedule B is referenced in the Standby Trust Agreement date May 15, 1990 by and between IMCO Recycling Inc. the "Grantor" and American National Bank and Trust Company the "Trustee."

The Fund consist of: (check one and provide identification number)

- ☒ (X) Irrevocable Letter of Credit No. 523
- ☐ () Surety Performance Bond No.
- ☐ () Other (describe)



ATTACHMENT S
NOT APPLICABLE

ATTACHMENT T EXISTING PERMITS

No permits or construction approvals are held for the IMCO Morgantown plant under Resource Conservation and Recovery Act (RCRA), Safe Drinking Water Act (SDWA), Clean Water Act (CWA), Clean Air Act (CAA) and Marine Protection Research and Sanctuaries Act.

IMCO Recycling Inc. has the following permits from the Kentucky Department for Environmental Protection:

- 1) Solid Waste Disposal Facility, Permit No: 016.04. This facility is about 600 feet southwest of the IMCO injection well.
- 2) Construction Permits from the Division of Air Quality, Permit Nos: C-89-014 and C-90-131.
- 3) IMCO Recycling Inc. has filed for NPDES permit with Kentucky Department for Environmental Protection.

ATTACHMENT U NATURE OF BUSINESS

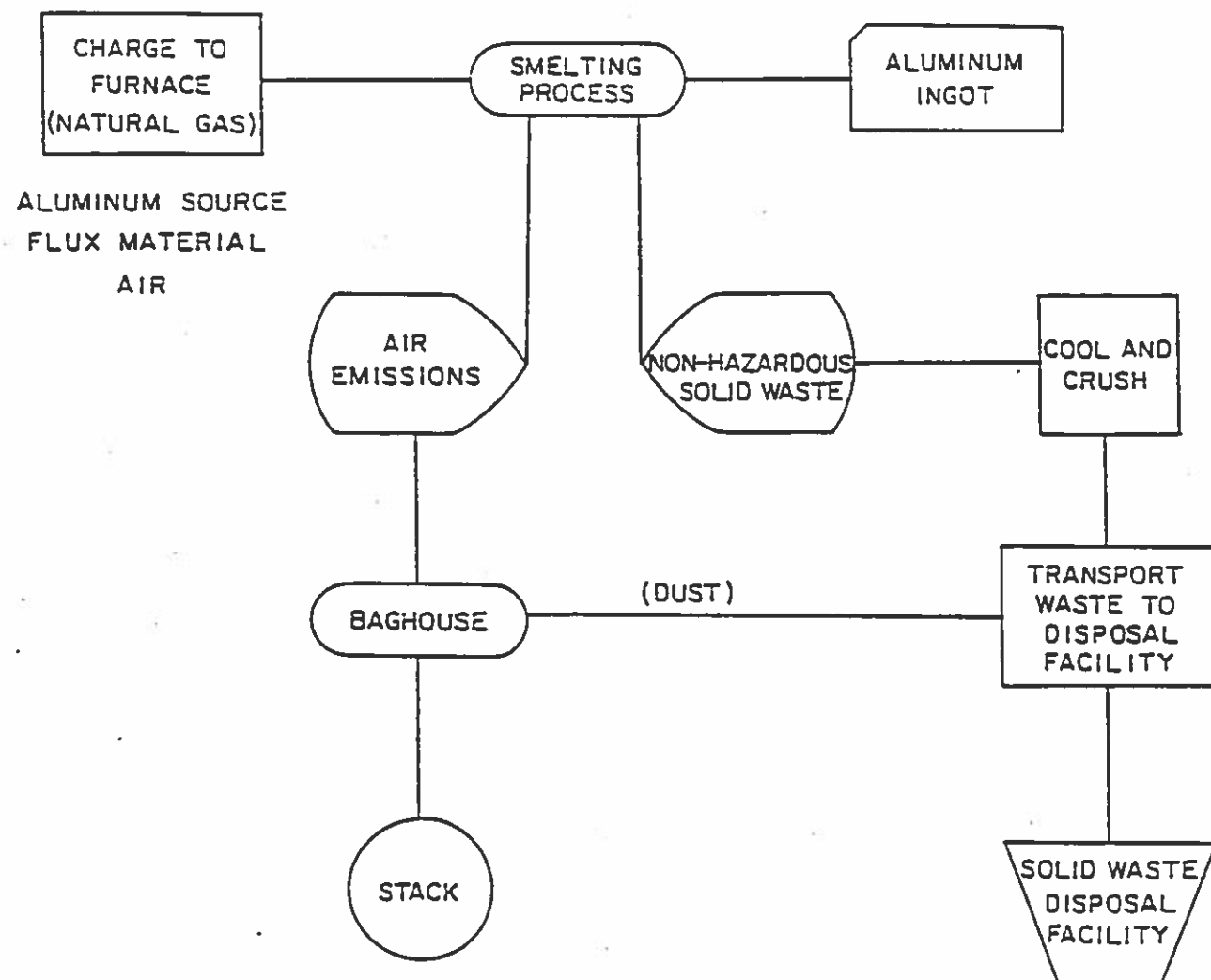
IMCO Recycling Inc. Morgantown Plant is a secondary aluminum smelter plant. The plant consists of six rotary furnaces, six burners and associated air pollution control equipment. Figure U-1 shows schematically the process diagram of the facility.

During the smelting process, the various types of scrap are charged to the furnace and melted. The "melt" is then covered with a salt flux (NaCl , KCl or MgCl_2) to reduce oxidation during scrap melting. As metal ingots or anodes are cast from the melt, the fluxing salts and non-metal contaminants from the scrap and dross remain in the furnace as solid waste. The slag (solid waste) is removed from the furnace and allowed to cool. After cooling, the slag is crushed and transported to the on-site non-hazardous solid waste disposal landfill.

The salt water leachate (brine) from the landfill and the contaminated runoff water from the plant site are injected into the on-site injection well.

FLOW CHART OF PLANT OPERATIONS

IMCO RECYCLING, INC. MORGANTOWN KENTUCKY



A. & M. ENGINEERING AND
ENVIRONMENTAL SERVICES, INC.
TULSA, OKLAHOMA

SCALE:

DATE

FIGURE U-1

APPROVED BY

DRAWN BY

DRAWING NO.

REFERENCES

- Gildersleeve, B., 1972, Geologic map of the Morgantown quadrangle, Butler and Warren Counties, Kentucky: U.S. Geol. Surv. Geol. Quad. Map GQ-1040.
- Hopkins, H.T., 1966, Fresh saline water interface map of Kentucky: Kentucky Geol. Surv., Series X, Scale 1:500,000.
- Maxwell, B.W., and Devaul, R.W., 1962, Reconnaissance of groundwater resources in the Western Coal Field Region, Kentucky: U.S. Geol. Surv. Water-Supply paper 1599, 34 p.
- Schwalb, H.R., 1975, Oil and gas in Butler County, Kentucky: Kentucky Geol. Survey, Series X, Report of Investigation 16, 65 p.
- Townsend, M.A., and Cordiviola, S., 1982, Evaluation of selected geologic units for potential use in underground storage of waste: Kentucky Geol. Survey.
- Warner, D.L., and Lehr, J.H., 1981, Subsurface wastewater injection - the technology of injecting wastewater into deep wells for disposal: Berkeley, CA., Premier Press, 344 p.

A & M ENGINEERING & ENVIRONMENTAL SERVICES, INC.



APPENDIX A

COPIES OF WELL REPORTS



APPENDIX B

**CHEMICAL ANALYSIS REPORT OF
SOLID WASTE AND LEACHATE**



IMCO RECYCLING INC.

P.O. BOX 1010
MORGANTOWN, KENTUCKY 42261

PHONE (502) 526-5688
FAX (502) 526-4822

March 29, 1990

Mr. Altay Ertugrul
A & M Engineering
3840 S. 103rd E. Avenue
Tulsa, OK 74146

Dear Altay:

The enclosed samples are as follows:

- Sample #1: Bag house Dust - Bag house Hopper
- Sample #2: Bag house Dust - Bag house Hopper
- Sample #3: Bag house Dust - Bag house Hopper
- Sample #4: Bag house Dust - Bin 2
- Sample #5: Bag house Dust - Bin 2
- Sample #6: Bag house Dust - Bin 2
- Sample #7: Salt Cake - Bin 15
- Sample #8: Salt Cake - Bin 15 Outside
- Sample #9: Salt Cake - Mud Building U. C.
- Sample #10: Salt Cake - Mud Building - Crushed
- Sample #11: Salt Cake - Mud Building - Crushed
- Sample #12: Salt Cake - Mud Building - Crushed

Lee

Lee



Testing Services, Inc.

6825 East 38th Street Tulsa, Oklahoma 74145
(918) 664-7767

TO: A & M Engineering Svc., Inc. MLTS #: 90-1977-1
3840 S. 103rd E. Ave. Date: 04/05/90
Tulsa, OK 74146 Date Sample Rec'd: 03/30/90

Attn: Altay Ertugrul

Sample Description: Composite of sample 3 and 6, IMCO Kentucky

EP-TOXICITY TEST

| <u>Parameter</u> | <u>Result*</u> | <u>Analyst</u> | <u>MCL(mg/l)</u> |
|------------------|----------------|----------------|------------------|
| Arsenic | <0.001 | SC | 5.0 |
| Barium | 0.80 | DM | 100.0 |
| Cadmium | 0.23 | DM | 1.0 |
| Chromium | 0.09 | DM | 5.00 |
| Lead | 0.50 | DM | 5.00 |
| Mercury | 0.0004 | SC | 0.20 |
| Selenium | <0.001 | SC | 1.0 |
| Silver | 0.02 | DM | 5.0 |

*In mg/l in the extract

MCL: Maximum Concentration Limit

OTHER

Flashpoint (degrees F) = NA

pH (Std.) of 10% Aqueous Extract = NA

REACTIVITY

Cyanide (mg/l) = NA

Sulfide (mg/l) = NA

Should you have any questions, please call.

Very truly yours,

METLAB TESTING SERVICES, INC.

Tony Mummolo, Supervisor
Inorganic Environmental Dept.

TM/pd

Specialists in chemical analysis, metallurgical and environmental control testing



MLTS 90-1977-1

TABLE IVolatile Organics on Composite #3 and #6

ANALYST: SDW DATE ANALYZED: 04/04 METHOD 8240-GC/MS VOLATILES

| <u>COMPOUND</u> | <u>RESULT</u> | <u>COMPOUND</u> | <u>RESULT</u> |
|----------------------------|---------------|-----------------------------|---------------|
| Acetone | ND | Cis-1,3-dichloropropylene | ND |
| Acrolein | ND | Trans-1,3-dichloropropylene | ND |
| Acrylonitrile | ND | Ethylbenzene | ND |
| Benzene | ND | Fluorotrichloromethane | ND |
| Bis (chloromethyl) ether | ND | 2-hexanone | ND |
| Bromodichloromethane | ND | Methylene chloride | ND |
| Bromoform | ND | Methy-isobuytl-ketone | ND |
| Bromomethane | ND | Methy-ethyl-ketone | ND |
| Carbon disulfide | 250 | Paraldehyde | ND |
| Carbon tetrachloride | ND | Styrene | ND |
| Chlorobnezene | ND | 1,1,2,2-tetrachloroethane | ND |
| Chlorodibromomethane | ND | Tetrachloroethylene | ND |
| Chloroethane | ND | Tolene | ND |
| 2-chloroethylvinyl ether | ND | 1,1,1-trichloroethane | ND |
| Chloroform | ND | 1,1,2-trichloroethane | ND |
| Chloromethane | ND | Trichloroethylene | ND |
| Dichlorodifluoromethane | ND | Vinyl acetate | ND |
| 1,1-dichloroethane | ND | Vinyl chloride | ND |
| 1,2-dichloroethane | ND | O-xylene | ND |
| 1,1-dichloroethylene | ND | M-xylene | ND |
| 1,2-trans-dichloroethylene | ND | P-xylene | ND |

All results reported in PPB unless otherwise specified
 ND = not detected at detection limit 50 PPB

SURROGATE RECOVERIES (%)

| | |
|-----------------------|-----|
| 1,2 dichloroethane-D4 | 96 |
| Toluene-D8 | 104 |
| Bromofluorobenzene | 99 |

Approved by

Tony Mummolo
 Tony Mummolo, Supervisor
 Inorganic Environmental Department

pd

MLTS 90-1977-A

TABLE IA

Additional Analysis on Composite of #3 and #6
IMCO, Kentucky

| <u>Paarameter</u> | <u>Result</u> | <u>Method</u> | <u>Date/Time</u> | <u>Analyst</u> |
|--|---------------|---------------|------------------|----------------|
| Chloride (20% Water Extract) mg/kg | 272, 965 | EPA 330.5 | 04/05 8:15 | KA |
| Chemical Oxygen Demand: NA | --- | --- | | |
| Total Dissolved Solids: NA | --- | --- | | |
| Total Organic Carbon: NA | --- | --- | | |
| Specific Conductance: NA | --- | --- | | |
| pH (Std) 20% Water Extract = | 8.31 | EPA 150.1 | 04/05 8:30 | KA |
| Total Iron (mg/kg) | 1379 | EPA 236.1 | 04/05 8:30 | KA |
| Total Sodium (mg/kg) | 66196 | EPA 273.1 | 04/05 8:30 | KA |
| Total Organic Halides: NA | --- | --- | 04/05 8:30 | KA |
| Total Arsenic (mg/kg) | 2.50 | EPA 206.3 | 04/04 3:00 | SC |
| Total Barium (mg/kg) | 72.5 | EPA 208.1 | 04/05 8:30 | DM |
| Total Cadmium (mg/kg) | 11.7 | EPA 213.1 | 04/05 8:30 | DM |
| Total Chromium (mg/kg) | 55.9 | EPA 218.1 | 04/05 8:30 | DM |
| Total Lead (mg/kg) | 50.7 | EPA 239.1 | 04/05 8:30 | DM |
| Total Mercury (mg/kg) | 0.022 | EPA 245.1 | 04/05 8:00 | SC |
| Nitrate (20% Water Extract) (mg/kg) | NA | --- | | AM |
| Total Selemium (mg/kg) | <0.025 | EPA 270.3 | 04/04 3:00 | SC |
| Total Silver (mg/kg) | 1.25 | EPA 272.1 | 04/05 8:30 | DM |

* NA = Not Applicable

Approved by



Tony Mummolo, Supervisor
Inorganic Environmental Department

pd

METLAB Testing Services, Inc.

6825 East 38th Street Tulsa, Oklahoma 74145
(918) 664-7767

TO: A & M Engineering

MLTS #: 90-1977-2

Date: 04/05/90

Date Sample Rec'd: 03/30/90

Attn: Altay Ertugrul

Sample Description: Composite of samples 7 & 9, IMCO (#9 MBI)
Kentucky (#7 Bin 15)

EP-TOXICITY TEST

| <u>Parameter</u> | <u>Result*</u> | <u>Analyst</u> | <u>MCL(mg/l)</u> |
|------------------|----------------|----------------|------------------|
| Arsenic | 0.001 | SC | 5.0 |
| Barium | 2.80 | DM | 100.0 |
| Cadmium | 0.08 | DM | 1.0 |
| Chromium | 0.09 | DM | 5.00 |
| Lead | 0.38 | DM | 5.00 |
| Mercury | 0.0003 | SC | 0.20 |
| Selenium | 0.02 | SC | 1.0 |
| Silver | 0.03 | DM | 5.0 |

*In mg/l in the extract

MCL: Maximum Concentration Limit

OTHER

Flashpoint (degrees F) = NA

pH (Std.) of 10% Aqueous Extract = NA

REACTIVITY

Cyanide (mg/l) = NA

| | | |
|----------------|---|----|
| Sulfide (mg/l) | = | NA |
|----------------|---|----|

Should you have any questions, please call.

Very truly yours,

METLAB TESTING SERVICES, INC.

Tony Munro

Tony Mummolo, Supervisor

Inorganic Environmental Dept.

Specialists in chemical analysis, metallurgical and environmental control testing

TM/pd



MLTS 90-1977-2

TABLE IVolatile Organics on Composite #7 and #9

ANALYST: SDW DATE ANALYZED: 04/04 METHOD 8240-GC/MS VOLATILES

| <u>COMPOUND</u> | <u>RESULT</u> | <u>COMPOUND</u> | <u>RESULT</u> |
|----------------------------|---------------|-----------------------------|---------------|
| Acetone | ND | Cis-1,3-dichloropropylene | ND |
| Acrolein | ND | Trans-1,3-dichloropropylene | ND |
| Acrylonitrile | ND | Ethylbenzene | ND |
| Benzene | ND | Fluorotrichloromethane | ND |
| Bis (chloromethyl) ether | ND | 2-hexanone | ND |
| Bromodichloromethane | ND | Methylene chloride | ND |
| Bromoform | ND | Methy-isobuytl-ketone | ND |
| Bromomethane | ND | Methy-ethyl-ketone | ND |
| Carbon disulfide | ND | Paraldehyde | ND |
| Carbon tetrachloride | ND | Styrene | ND |
| Chlorobnezene | ND | 1,1,2,2-tetrachloroethane | ND |
| Chlorodibromomethane | ND | Tetrachloroethylene | ND |
| Chloroethane | ND | Tolene | ND |
| 2-chloroethylvinyl ether | ND | 1,1,1-trichloroethane | ND |
| Chloroform | ND | 1,1,2-trichloroethane | ND |
| Chloromethane | ND | Trichloroethylene | ND |
| Dichlorodifluoromethane | ND | Vinyl acetate | ND |
| 1,1-dichloroethane | ND | Vinyl chloride | ND |
| 1,2-dichloroethane | ND | O-xylene | ND |
| 1,1-dichloroethylene | ND | M-xylene | ND |
| 1,2-trans-dichloroethylene | ND | P-xylene | ND |

All results reported in PPB unless otherwise specified
 ND = not detected at detection limit 50 PPB

SURROGATE RECOVERIES (%)

| | |
|-----------------------|-----|
| 1,2 dichloroethane-D4 | 102 |
| Toluene-D8 | 110 |
| Bromofluorobenzene | 92 |

Approved by

Tony Mummolo
 Tony Mummolo, Supervisor
 Inorganic Environmental Department

pd

MLTS 90-1977-2A

TABLE IA

Additional Analysis on Composite of #7 and #9
IMCO, Kentucky

| <u>Parameter</u> | <u>Result</u> | <u>Method</u> | <u>Date/Time</u> | <u>Analyst</u> |
|--|---------------|---------------|------------------|----------------|
| Chloride (20% Water Extract) mg/kg | 207, 383 | EPA 330.5 | 04/05 8:30 | KA |
| Chemical Oxygen Demand: NA | --- | --- | | |
| Total Dissolved Solids: NA | --- | --- | | |
| Total Organic Carbon: NA | --- | --- | | |
| Specific Conductance: NA | --- | --- | | |
| pH (Std) 20% Water Extract = | 9.93 | EPA 150.1 | 04/05 8:30 | KA |
| Total Iron (mg/kg) | 1008 | EPA 236.1 | 04/05 8:30 | KA |
| Total Sodium (mg/kg) | 74024 | EPA 273.1 | 04/05 8:30 | KA |
| Total Organic Halides: NA | --- | --- | | |
| Total Arsenic (mg/kg) | 0.175 | EPA 206.3 | 04/04 3:00 | SC |
| Total Barium (mg/kg) | 100 | EPA 208.1 | 04/05 8:30 | DM |
| Total Cadmium (mg/kg) | 3.13 | EPA 213.1 | 04/05 8:30 | DM |
| Total Chromium (mg/kg) | 53.5 | EPA 218.1 | 04/05 8:30 | DM |
| Total Lead (mg/kg) | 37.3 | EPA 239.1 | 04/05 8:30 | DM |
| Total Mercury (mg/kg) | 0.004 | EPA 245.1 | 04/05 8:00 | SC |
| Nitrate (20% Water Extract) (mg/kg) | NA | --- | | AM |
| Total Selenium (mg/kg) | <0.025 | EPA 270.3 | 04/04 3:00 | SC |
| Total Silver (mg/kg) | 1.25 | EPA 272.1 | 04/05 8:30 | DM |

* NA = Not Applicable

Approved by

Tony Mummolo
Tony Mummolo, Supervisor
Inorganic Environmental Department

pd

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: A&N ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE, SUITE 227
TULSA, OKLAHOMA 74146
ATTN: MURRAY R. McCOMAS

REPORT: 2786.01MT

DATE: 06-28-90

SAMPLE MATRIX: UNKNOWN

SWLO # 2786.01

DATE SUBMITTED: 06-08-90

PROJECT: 1175; IMCO RECOVERING INC.; KENTUCKY

SAMPLE ID: LE #10 SALTCAKE

| PARAMETER | DET. LIMIT | UNIT | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---------------------------|---------------|------|---------|------------------|---------------------|
| <u>EP TOXICITY METALS</u> | | | | | |
| ARSENIC | 0.035 | mg/L | ND | 06-20-90 | SW 6010 |
| BARIUM | 0.02 | mg/L | 0.74 | 06-20-90 | SW 6010 |
| CADMIUM | 0.005 | mg/L | ND | 06-20-90 | SW 6010 |
| CHROMIUM | 0.005 | mg/L | 0.14 | 06-20-90 | SW 6010 |
| LEAD | 0.05 | mg/L | ND | 06-20-90 | SW 6010 |
| MERCURY | 0.0002 | mg/L | ND | 06-23-90 | SW 7471 |
| COPPER | 0.01 | mg/L | ND | 06-20-90 | SW 6010 |
| SELENIUM | 0.03 | mg/L | 0.077 | 06-20-90 | SW 6010 |

ND = NOT DETECTED ABOVE LIMIT OF QUANTITATION
SW = EPA METHOD REFERENCES, "SW846"

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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CLIENT: A&M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE, SUITE 227
TULSA, OKLAHOMA 74146
ATTN: MURRAY R. McCOMAS

REPORT: 2786.01EP

DATE: 07-09-90

SAMPLE MATRIX: UNKNOWN, TCLP EXTRACTION
SWLO # 2786.01

DATE SUBMITTED: 06-08-90
DATE EXTRACTED: 06-20-90
DATE ANALYZED : 07-02-90

PROJECT: 1175; IMCO RECYCLING INC.; KENTUCKY
METHOD REFERENCE: SW846-8080, EPA METHODOLOGY
SAMPLE ID: SAMPLE #10 SALTCAKE

RESULTS REPORTED IN ug/L OR Parts Per Billion (PPB)

| <u>PESTICIDES/PCB'S</u> | <u>DETECTION LIMIT</u> | <u>RESULTS</u> |
|-------------------------|------------------------|----------------|
| GAMMA-BHC | 80 | ND |
| ENDRIN | 4.0 | ND |
| METHOXYCHLOR | 2000 | ND |
| TOXAPHENE | 100 | ND |

QA/QC SURROGATE RECOVERIES

DIBUTYLCHLOREDATE (24-154) 103%

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: A&M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE, SUITE 227
TULSA, OKLAHOMA 74146
ATTN: MURRAY R. McCOMAS

REPORT: 2786.01VT

DATE: 06-28-90

SAMPLE MATRIX: UNKNOWN, TCLP EXTRACTION
SWLO # 2786.01
DATE SUBMITTED: 06-08-90
PROJECT: 1175; IMCO RECYCLING INC.; KEN
SAMPLE ID: SAMPLE #10 SALTCAKE

| PARAMETER | DET. LIMIT | UNIT | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|-----------------------|---------------|------|---------|------------------|---------------------|
| <u>TCLP VOLATILES</u> | | | | | |
| BENZENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| CARBON TETRA CHLORIDE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| CHLOROBENZENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| CHLOROFORM | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| 1,2-DICHLOROETHANE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| 1,1-DICHLOROETHENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| TETRACHLOROETHENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| TRICHLOROETHENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| VINYL CHLORIDE | 10 | ug/L | ND | 06-18-90 | SW 8240 |

QA/QC SURROGATE RECOVERIES

TOLUENE-d8(81-117) 98%
BROMOFLUOROBENZENE(74-121) 109%
1,2-DICHLOROETHANE-d4(70-121) 93%

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
SW = EPA METHODOLOGY "#SW846", THIRD EDITION

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1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2855

CLIENT: A&M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE, SUITE 227
TULSA, OKLAHOMA 74146
ATTN: MURRAY R. McCOMAS

REPORT: 2786.01B

DATE: 07-10-90

SAMPLE MATRIX: UNKNOWN, TCLP EXTRACTION
SWLO # 2786.01
DATE SUBMITTED: 06-08-90
DATE EXTRACTED: 06-20-90
DATE ANALYZED: 07-05-90
METHOD REFERENCE: SW846-B270, EPA METHODOLOGY
SAMPLE ID: SAMPLE #10 SALTCAKE

RESULTS REPORT IN ug/L OR Parts Per Billion (PPB)

| <u>TCLP SEMIVOLATILES</u> | <u>DET. LIMIT</u> | <u>RESULTS</u> |
|---------------------------|-----------------------|----------------|
| O-CRESOL | 20 | ND |
| M-CRESOL | 20 | ND |
| P-CRESOL | 20 | ND |
| TOTAL CRESOL'S** | 20 | ND |
| 1,4-DICHLOROBENZENE | 20 | ND |
| 2,4-DINITROTOLUENE | 20 | ND |
| HEXACHLOROBENZENE | 20 | ND |
| PENTACHLOROPHENOL | 20 | ND |
| 2,4,5-TRICHLOROPHENOL | 20 | ND |
| 2,4,6-TRICHLOROPHENOL | 20 | ND |
| HEXACHLOROBTADIENE | 20 | ND |
| HEXACHLOROETHANE | 20 | ND |
| NITROBENZENE | 20 | ND |
| PYRIDINE | 20 | ND |

QA/QC SURROGATE RECOVERIES

| | | | | | |
|-------------------------|-------------|--------------------------|---------------|----------------------|----------|
| NITROBENZENE-d5(35-114) | 52% | 2-FLUOROBIPHENYL(43-116) | 62% | TERPHENYL-d14 | (33-141) |
| PHENOL-d5 | (10-94) 20% | 2-FLUOROPHENOL | (21-100) 13%* | 2,4,6-TRIBROMOPHENOL | (10-123) |

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
** = COMBINATIONS OF O, M, AND P CRESOLS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: A&M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE, SUITE 227
TULSA, OKLAHOMA 74146
ATTN: MURRAY R. McCOMAS

REPORT: 2786.02MT

DATE: 06-28-90

SAMPLE MATRIX: UNKNOWN

SWLO # 2786.02

DATE SUBMITTED: 06-08-90

PROJECT: 1175; IMCO RECYCLING INC.; KENTUCKY

SAMPLE ID: SAMPLE #2 & #4

| PARAMETER | DET. LIMIT | UNIT | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|---------------------------|---------------|------|---------|------------------|---------------------|
| <u>EP TOXICITY METALS</u> | | | | | |
| ARSENIC | 0.035 | mg/L | ND | 06-20-90 | SW 6010 |
| BARIUM | 0.02 | mg/L | 0.20 | 06-20-90 | SW 6010 |
| CADMIUM | 0.005 | mg/L | 0.026 | 06-20-90 | SW 6010 |
| CHROMIUM | 0.005 | mg/L | ND | 06-20-90 | SW 6010 |
| LEAD | 0.05 | mg/L | ND | 06-20-90 | SW 6010 |
| MERCURY | 0.0002 | mg/L | ND | 06-23-90 | SW 7471 |
| SILVER | 0.01 | mg/L | ND | 06-20-90 | SW 6010 |
| SELENIUM | 0.03 | mg/L | 0.24 | 06-20-90 | SW 6010 |

ND = NOT DETECTED ABOVE LIMIT OF QUANTITATION
SW = EPA METHOD REFERENCES, "SW846"

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2555

CLIENT: A&M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE, SUITE 227
TULSA, OKLAHOMA 74146
ATTN: MURRAY R. McCOMAS

REPORT: 2786.02EP

DATE: 07-09-90

SAMPLE MATRIX: UNKNOWN, TCLP EXTRACTION
SWLO # 2786.02

DATE SUBMITTED: 06-08-90
DATE EXTRACTED: 06-20-90
DATE ANALYZED : 07-03-90

PROJECT: 1175; IMCO RECYCLING INC.; KENTUCKY
METHOD REFERENCE: SW846-8080, EPA METHODOLOGY
SAMPLE ID: SAMPLE #2 & #4

RESULTS REPORTED IN ug/L OR Parts Per Billion (PPB)

| <u>PESTICIDES/PCB'S</u> | <u>DETECTION LIMIT</u> | <u>RESULTS</u> |
|-------------------------|------------------------|----------------|
| GAMMA-BHC | 8 | ND |
| ENDRIN | .4 | ND |
| METHOXYCHLOR | 200 | ND |
| TOXAPHENE | 10 | ND |

QA/QC SURROGATE RECOVERIES

DIBUTYLCHLORENDATE (24-154) 122%

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: A&M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE, SUITE 227
TULSA, OKLAHOMA 74146
ATTN: MURRAY R. McCOMAS

REPORT: 2786.02VT

DATE: 06-28-90

SAMPLE MATRIX: UNKNOWN, TCLP EXTRACTION
SWLO # 2786.02
DATE SUBMITTED: 06-08-90
PROJECT: 1175; IMCO RECYCLING INC.; KENTUCKY
SAMPLE ID: SAMPLE #2 & #4

| PARAMETER | DET. LIMIT | UNIT | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|-----------------------|---------------|------|---------|------------------|---------------------|
| <u>TCLP VOLATILES</u> | | | | | |
| BENZENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| CARBON TETRA CHLORIDE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| CHLOROBENZENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| CHLOROFORM | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| 1,2-DICHLOROETHANE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| 1,1-DICHLOROETHENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| TETRACHLOROETHENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| TRICHLOROETHENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| VINYL CHLORIDE | 10 | ug/L | ND | 06-18-90 | SW 8240 |

QA/QC SURROGATE RECOVERIES

TOLUENE-d8(81-117) 95%
BROMOFLUOROBENZENE(74-121) 102%
1,2-DICHLOROETHANE-d4(70-121) 90%

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
SW = EPA METHODOLOGY "#SW846", THIRD EDITION

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: A&M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE, SUITE 227
TULSA, OKLAHOMA 74146
ATTN: MURRAY R. McCOMAS

REPORT: 2786.02B

DATE: 07-10-90

SAMPLE MATRIX: UNKNOWN, TCLP EXTRACTION
SWLO # 2786.02
DATE SUBMITTED: 06-08-90
DATE EXTRACTED: 06-20-90
DATE ANALYZED: 07-05-90
METHOD REFERENCE: SW846-B270, EPA METHODOLOGY
SAMPLE ID: SAMPLE #2 & #4

RESULTS REPORT IN ug/L OR Parts Per Billion (PPB)

| <u>TCLP SEMIVOLATILES</u> | <u>DET. LIMIT</u> | <u>RESULTS</u> |
|---------------------------|-----------------------|----------------|
| O-CRESOL | 20 | ND |
| M-CRESOL | 20 | ND |
| P-CRESOL | 20 | ND |
| TOTAL CRESOL'S** | 20 | ND |
| 1,4-DICHLOROBENZENE | 20 | ND |
| 2,4-DINITROTOLUENE | 20 | ND |
| HEXACHLOROBENZENE | 20 | ND |
| PENTACHLOROPHENOL | 20 | ND |
| 2,4,5-TRICHLOROPHENOL | 20 | ND |
| 2,4,6-TRICHLOROPHENOL | 20 | ND |
| HEXACHLOROBTADIENE | 20 | ND |
| HEXACHLOROETHANE | 20 | ND |
| NITROBENZENE | 20 | ND |
| PYRIDINE | 20 | ND |

QA/QC SURROGATE RECOVERIES

| | | | | | | |
|-------------------------|---------|--------------------------|----------------|---------------|----------|------------------------------|
| NITROBENZENE-d5(35-114) | 58% | 2-FLUOROBIPHENYL(43-116) | 56% | TERPHENYL-d14 | (33-141) | |
| PHENOL-d5 | (10-94) | 78% | 2-FLUOROPHENOL | (21-100) | 62% | 2,4,6-TRIBROMOPHENOL(10-123) |

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
** = COMBINATIONS OF O, M, AND P CRESOLS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: A&M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE, SUITE 227
TULSA, OKLAHOMA 74146
ATTN: MURRAY R. McCOMAS

REPORT: G3005

DATE: 07-09-90

SAMPLE MATRIX: UNKNOWN
SWLO # METHOD BLANK
DATE EXTRACTED: 06-20-90
DATE ANALYZED: 07-02-90
PROJECT: 1175; IMCO RECYCLING INC.; KENTUCKY
METHOD REFERENCE: SW846-8080, EPA METHODOLOGY
SAMPLE ID: METHOD BLANK

RESULTS REPORTED IN ug/L OR Parts Per Billion (PPB)

| <u>PESTICIDES/PCB'S</u> | <u>DETECTION LIMIT</u> | <u>RESULTS</u> |
|-------------------------|------------------------|----------------|
| GAMMA-BHC | 4.0 | ND |
| ENDRIN | 0.2 | ND |
| METHOXYCHLOR | 100 | ND |
| TOXAPHENE | 5.0 | ND |

QA/QC SURROGATE RECOVERIES

DIBUTYLCHLORENDATE (24-154) 140%

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: A&M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE, SUITE 227
TULSA, OKLAHOMA 74146
ATTN: MURRAY R. McCOMAS

REPORT: G3005.2

DATE: 07-09-90

SAMPLE MATRIX: UNKNOWN
SWLO # TCLP EXTRACTION BLANK
DATE EXTRACTED: 06-20-90
DATE ANALYZED : 07-02-90
PROJECT: 1175; IMCO RECYCLING INC.; KENTUCKY
METHOD REFERENCE: SW846-8080, EPA METHODOLOGY
SAMPLE ID: TCLP BLANK

RESULTS REPORTED IN ug/L OR Parts Per Billion (PPB)

| <u>PESTICIDES/PCB'S</u> | <u>DETECTION LIMIT</u> | <u>RESULTS</u> |
|-------------------------|------------------------|----------------|
| GAMMA-BHC | 20.0 | ND |
| ENDRIN | 1.0 | ND |
| METHOXYCHLOR | 500 | ND |
| TOXAPHENE | 25.0 | ND |

QA/QC SURROGATE RECOVERIES

DIBUTYLCHLORENDATE (24-154) 142%

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: A&M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE, SUITE 227
TULSA, OKLAHOMA 74146
ATTN: MURRAY R. McCOMAS

REPORT: G3005.3

DATE: 06-28-90

SAMPLE MATRIX: UNKNOWN, TCLP EXTRACTION
SWLO # METHOD BLANK
PROJECT: 1175; IMCO RECYCLING INC.; KENTUCKY
SAMPLE ID: METHOD BLANK

| PARAMETER | DET. LIMIT | UNIT | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|-----------------------|---------------|------|---------|------------------|---------------------|
| <u>TCLP VOLATILES</u> | | | | | |
| BENZENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| CARBON TETRA CHLORIDE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| CHLOROBENZENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| CHLOROFORM | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| 1,2-DICHLOROETHANE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| 1,1-DICHLOROETHENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| TETRACHLOROETHENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| TRICHLOROETHENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| VINYL CHLORIDE | 10 | ug/L | ND | 06-18-90 | SW 8240 |

QA/QC SURROGATE RECOVERIES

| | |
|-------------------------------|------|
| TOLUENE-d8(81-117) | 107% |
| BROMOFLUOROBENZENE(74-121) | 108% |
| 1,2-DICHLOROETHANE-d4(70-121) | 97% |

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
SW = EPA METHODOLOGY "#SW846", THIRD EDITION

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: A&M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE, SUITE 227
TULSA, OKLAHOMA 74146
ATTN: MURRAY R. McCOMAS

REPORT: G3005.4

DATE: 06-28-90

SAMPLE MATRIX: UNKNOWN, TCLP EXTRACTION
SWLO # TCLP EXTRACTION BLANK
PROJECT: 1175; IMCO RECYCLING INC.; KENTUCKY
SAMPLE ID: TCLP BLANK

| PARAMETER | DET. LIMIT | UNIT | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|-----------------------|---------------|------|---------|------------------|---------------------|
| <u>TCLP VOLATILES</u> | | | | | |
| BENZENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| CARBON TETRA CHLORIDE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| CHLOROBENZENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| CHLOROFORM | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| 1,2-DICHLOROETHANE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| 1,1-DICHLOROETHENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| TETRACHLOROETHENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| TRICHLOROETHENE | 5 | ug/L | ND | 06-18-90 | SW 8240 |
| VINYL CHLORIDE | 10 | ug/L | ND | 06-18-90 | SW 8240 |

QA/QC SURROGATE RECOVERIES

| | |
|-------------------------------|------|
| TOLUENE-d8(81-117) | 100% |
| BROMOFLUOROBENZENE(74-121) | 101% |
| 1,2-DICHLOROETHANE-d4(70-121) | 92% |

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION
B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
SW = EPA METHODOLOGY "#SW846", THIRD EDITION

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: A&M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE, SUITE 227
TULSA, OKLAHOMA 74146
ATTN: MURRAY R. McCOMAS

REPORT: G3005.5

DATE: 07-10-90

SAMPLE MATRIX: UNKNOWN, TCLP EXTRACTION
SWLO # METHOD BLANK
DATE EXTRACTED: 06-20-90
DATE ANALYZED: 06-29-90
METHOD REFERENCE: SW846-8270, EPA METHODOLOGY
SAMPLE ID: METHOD BLANK

RESULTS REPORT IN ug/L OR Parts Per Billion (PPB)

| <u>TCLP SEMIVOLATILES</u> | <u>DET. LIMIT</u> | <u>RESULTS</u> |
|---------------------------|-----------------------|----------------|
| O-CRESOL | 10 | ND |
| M-CRESOL | 10 | ND |
| P-CRESOL | 10 | ND |
| TOTAL CRESOL'S** | 10 | ND |
| 1,4-DICHLOROBENZENE | 10 | ND |
| 1,4-DINITROTOLUENE | 10 | ND |
| HEXACHLOROBENZENE | 10 | ND |
| PENTACHLOROPHENOL | 10 | ND |
| 2,4,5-TRICHLOROPHENOL | 10 | ND |
| 2,4,6-TRICHLOROPHENOL | 10 | ND |
| HEXACHLOROBUTADIENE | 10 | ND |
| HEXACHLOROETHANE | 10 | ND |
| NITROBENZENE | 10 | ND |
| PYRIDINE | 10 | ND |

QA/QC SURROGATE RECOVERIES

| | | | | | | | |
|-------------------------|---------|--------------------------|----------------|---------------|----------|------------------------------|-----|
| NITROBENZENE-d5(35-114) | 49% | 2-FLUOROBIPHENYL(43-116) | 49% | TERPHENYL-d14 | (33-141) | 55% | |
| PHENOL-d5 | (10-94) | 61% | 2-FLUOROPHENOL | (21-100) | 54% | 2,4,6-TRIBROMOPHENOL(10-123) | 45% |

ND = NOT DETECTED ABOVE QUANTITATION LIMIT

J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION

B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE

* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

** = COMBINATIONS OF O, M, AND P CRESOLS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: A&M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE, SUITE 227
TULSA, OKLAHOMA 74146
ATTN: MURRAY R. MCCOMAS

REPORT: G3005.6

DATE: 07-10-90

SAMPLE MATRIX: UNKNOWN, TCLP EXTRACTION
SWLO # TCLP EXTRACTION BLANK
DATE EXTRACTED: 06-20-90
DATE ANALYZED: 06-28-90
METHOD REFERENCE: SW846-8270, EPA METHODOLOGY
SAMPLE ID: TCLP BLANK

RESULTS REPORT IN ug/L OR Parts Per Billion (PPB)

| <u>TCLP SEMIVOLATILES</u> | <u>DET. LIMIT</u> | <u>RESULTS</u> |
|---------------------------|-----------------------|----------------|
| O-CRESOL | 50 | ND |
| M-CRESOL | 50 | ND |
| P-CRESOL | 50 | ND |
| TOTAL CRESOL'S** | 50 | ND |
| 1,4-DICHLOROBENZENE | 50 | ND |
| 2,4-DINITROTOLUENE | 50 | ND |
| HEXACHLOROBENZENE | 50 | ND |
| PENTACHLOROPHENOL | 50 | ND |
| 2,4,5-TRICHLOROPHENOL | 50 | ND |
| 2,4,6-TRICHLOROPHENOL | 50 | ND |
| HEXACHLOROBTADIENE | 50 | ND |
| HEXACHLOROETHANE | 50 | ND |
| NITROBENZENE | 50 | ND |
| PYRIDINE | 50 | ND |

QA/QC SURROGATE RECOVERIES

| | | | | | | |
|-------------------------|-------------|--------------------------|--------------|----------------------|----------|----|
| NITROBENZENE-d5(33-114) | 56% | 2-FLUOROBIPHENYL(43-116) | 62% | TERPHENYL-d14 | (33-141) | 84 |
| PHENOL-d5 | (10-94) 74% | 2-FLUOROPHENOL | (21-100) 70% | 2,4,6-TRIBROMOPHENOL | (10-123) | 51 |

ND = NOT DETECTED ABOVE QUANTITATION LIMIT

J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION

B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE

* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

** = COMBINATIONS OF O, M, AND P CRESOLS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Suite "C" • Broken Arrow, Oklahoma 74012 • 918-251-2858

CLIENT: A&M ENGINEERING & ENVIRONMENTAL SERVICES.
3840 SOUTH 103RD EAST AVENUE, SUITE 227
TULSA, OKLAHOMA 74146
ATTN: MURRAY R. McCOMAS

REPORT: G3005.7

DATE: 07-10-90

SAMPLE MATRIX: UNKNOWN, TCLP EXTRACTION
SWLO # TCLP EXTRACTION BLANK
DATE EXTRACTED: 06-20-90
DATE ANALYZED: 06-28-90
METHOD REFERENCE: SW846-8270, EPA METHODOLOGY
SAMPLE ID: TCLP BLANK

RESULTS REPORT IN ug/L OR Parts Per Billion (PPB)

| <u>TCLP SEMIVOLATILES</u> | <u>DET. LIMIT</u> | <u>RESULTS</u> |
|---------------------------|-----------------------|----------------|
| O-CRESOL | 50 | ND |
| M-CRESOL | 50 | ND |
| P-CRESOL | 50 | ND |
| TOTAL CRESOL'S** | 50 | ND |
| 1,4-DICHLOROBENZENE | 50 | ND |
| 2,4-DINITROTOLUENE | 50 | ND |
| HEXACHLOROBENZENE | 50 | ND |
| PENTACHLOROPHENOL | 50 | ND |
| 2,4,5-TRICHLOROPHENOL | 50 | ND |
| 2,4,6-TRICHLOROPHENOL | 50 | ND |
| HEXACHLOROBUTADIENE | 50 | ND |
| HEXACHLOROETHANE | 50 | ND |
| NITROBENZENE | 50 | ND |
| PYRIDINE | 50 | ND |

QA/QC SURROGATE RECOVERIES

| | | | | | | |
|-------------------------|-------------|--------------------------|--------------|----------------------|----------|-----|
| NITROBENZENE-d5(35-114) | 61% | 2-FLUOROBIPHENYL(43-116) | 60% | TERPHENYL-d14 | (33-141) | 95% |
| PHENOL-d5 | (10-94) 76% | 2-FLUOROPHENOL | (21-100) 64% | 2,4,6-TRIBROMOPHENOL | (10-123) | 57% |

ND = NOT DETECTED ABOVE QUANTITATION LIMIT

J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION

B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE

* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

** = COMBINATIONS OF O, M, AND P CRESOLS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. ALBANY SUITE C BROKEN ARROW, OK 74012 918 251-2858

Client Name: A & M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE
SUITE 227
TULSA, OK 74146

Client ID: LEACHATE

Project ID: IMCO-KY.

SWLO ID: 3015.07

Report: 3015.07

Collected: 07/02/90

Report Date: 08/01/90

Page: 1

Received: 07/03/90

Last Modified:

Matrix: Water

| TEST | DATE EXTRACTED | DETECTION LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|--------------------|-------------------|--------------------|-------|---------|------------------|---------------------|
| *** INORGANICS *** | | | | | | |
| ALKALINITY | | 1 | mg/l | 88 | 07/06/90 | SM 403/EPA 310.1 |
| ORGANIC CARBON | | 5.00 | mg/l | 16 | 07/30/90 | EPA 415.1/SM 505 |
| INORGANIC CHLORIDE | | 20 | mg/l | 9,260 | 07/24/90 | EPA 300.0 |
| ORGANIC CHLORIDE | | 0.01 | mg/l | ND | 07/23/90 | SW 9020 |
| CCO | | 10 | mg/l | 40 | 07/25/90 | SM 508A/EPA 410.1 |
| SPEC.GRAVITY | | | | 1.010 | 07/27/90 | SM 213E |
| NITRATE | | 2 | mg/l | ND | 07/24/90 | EPA 300.0 |
| TDS | | 1 | mg/l | 14,215 | 07/27/90 | EPA 160.1 |
| SULFATE | | 2 | mg/l | 37 | 07/24/90 | EPA 300.0 |
| *** METALS *** | | | | | | |
| ARSENIC | | 35.0 | UG/L | ND | 08/01/90 | SW 7060 |
| BARIUM | | 20 | UG/L | 251 | 07/26/90 | SW 6010 |
| CADMIUM | | 5.0 | UG/L | ND | 07/26/90 | SW 6010 |
| CHROMIUM | | 5.0 | UG/L | ND | 07/26/90 | SW 6010 |
| IRON | | 30 | UG/L | 51.7 | 07/26/90 | SW 6010 |
| LEAD | | 20.0 | UG/L | ND | 08/01/90 | SW 7421 |
| MERCURY | | 0.2 | UG/L | ND | 07/23/90 | SW 7470 |
| SELENIUM | | 30.0 | UG/L | ND | 08/01/90 | SW 7740 |
| SILVER | | 10 | UG/L | ND | 07/26/90 | SW 6010 |
| SODIUM | | 500 | UG/L | 2350000 | 07/26/90 | SW 6010 |

ND = NOT DETECTED ABOVE QUANTITATION LIMIT

B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE

I = UNABLE TO QUANTITATE DUE TO MATRIX INTERFERENCE

NA = NOT APPLICABLE

Methodology: SM = STANDARD METHODS, 16th EDITION, 1985

EPA = EPA600/4-79-020, MARCH 1985

= = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

D = SURROGATES DILUTED OUT

J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION

SW = EPA METHODOLOGY, "SW846", THIRD EDITION, NOVEMBER 1986

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. ALBANY SUITE C BROKEN ARROW, OK 74012 918 251-2858

Client Name: A & M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE
SUITE 227
TULSA, OK 74146

Client ID: LEACHATE POND

Project ID: IN MET KY.

SWLO ID: 4667.08

Report: 4667.08

Collected: 12/19/90

Report Date: 01/18/91

Page: 1

Received: 12/20/90

Last Modified:

Matrix: Water

| TEST | DATE EXTRACTED | DETECTION LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|------|-------------------|--------------------|-------|---------|------------------|---------------------|
|------|-------------------|--------------------|-------|---------|------------------|---------------------|

*** HAZARDOUS WASTE ***

TCLP EXTRACTION

extract 01/03/91

*** INORGANICS ***

| | | | | | |
|--------------------|------|----------|-------|----------|-------------------|
| AMMONIA (N) | 10 | MG/L | 137 | 12/27/90 | EPA 350.3/SM 417E |
| ORGANIC CARBON | 5.0 | mg/l | nd | 01/17/91 | EPA 415.1/SM 505 |
| INORGANIC CHLORIDE | 0.2 | mg/l | 2010 | 12/28/90 | EPA 300.0 |
| ORGANIC CHLORIDE | 0.01 | mg/l | 0.14 | 01/11/91 | SW 9020 |
| CONDUCTANCE | NA | umhos/cm | 7,100 | 01/17/91 | SM 205 |
| COD | 10 | mg/l | ND | 12/28/90 | SM 508A/EPA 410.1 |
| NITRATE | 0.2 | mg/l | ND | 12/28/90 | EPA 300.0 |
| PH | NA | S.U. | 9.16 | 12/21/90 | EPA 150.1/SM 423 |
| SULFATE | 0.2 | mg/l | 30.5 | 12/28/90 | EPA 300.0 |

*** METALS ***

METALS -ICP

| | | | | | |
|----------|------|------|--------|----------|---------|
| ARSENIC | .05 | mg/l | ND | 01/08/91 | SW6010 |
| BARIUM | .02 | mg/l | .11 | 01/08/91 | |
| CADMIUM | .005 | mg/l | ND | 01/08/91 | |
| CHROMIUM | .005 | mg/l | ND | 01/08/91 | |
| LEAD | .05 | mg/l | ND | 01/08/91 | |
| MERCURY | .02 | mg/l | ND | 01/08/91 | |
| SILVER | .01 | mg/l | ND | 01/08/91 | |
| SELENIUM | .05 | mg/l | ND | 01/08/91 | |
| IRON | 30 | ug/l | 182 | 01/02/91 | SW 6010 |
| SODIUM | 500 | ug/l | 790000 | 01/02/91 | SW 6010 |

ND = NOT DETECTED ABOVE QUANTITATION LIMIT

B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE

I = UNABLE TO QUANTITATE DUE TO MATRIX INTERFERENCE

NA = NOT APPLICABLE

Methodology: SM = STANDARD METHODS, 16th EDITION, 1985

EPA = #EPA600/4-79-020, MARCH 1985

* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

D = SURROGATES DILUTED OUT

J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION

SW = EPA METHODOLOGY, "#SW846", THIRD EDITION, NOVEMBER 1986

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. ALBANY SUITE C BROKEN ARROW, OK 74012 918 251-2858

Client Name: A & M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE
SUITE 227
TULSA, OK 74146

Client ID: LECHATE POND

Project ID: IMCO, KY.

SWLO ID: 9883.07

Report: 9883.07

Collected: 06/05/1992

Report Date: 07-01-1992

Page: 1

Received: 06/08/1992

Last Modified:

Matrix: Water

| TEST | DATE EXTRACTED | DETECTION LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|--------------------|-------------------|--------------------|-----------|---------|------------------|---------------------|
| *** INORGANICS *** | | | | | | |
| AMMONIA (N) | | 100 | mg/l | 450 | 06/16/92 | EPA 350.3/SM 417E |
| INORGANIC CHLORIDE | | 200 | mg/l | 10031 | 06/10/92 | EPA 300.0 |
| CONDUCTANCE | | 1 | umhos/cm | 29000 | 06/09/92 | SM 205 |
| SPEC.GRAVITY | | 0.01 | | 1.01 | 06/09/92 | SM 213E |
| NITRATE | | 0.2 | mg/l | 7.0 | 06/09/92 | EPA 300.0 |
| NITRITE IONCHRO | | 0.2 | mg/l | ND | 06/09/92 | EPA 300.0 |
| pH | | 0.1 | S.U. 225c | 9.33 | 06/09/92 | EPA 150.1/SM 423 |
| TSS | | 1 | mg/l | 16 | 06/09/92 | EPA 160.2 |
| *** METALS *** | | | | | | |
| CADMIUM | | 5.0 | ug/l | ND | 06/12/92 | SW 6010 |
| LEAD | | 200 | ug/l | 57.5 | 06/12/92 | SW 6010 |
| MAGNESIUM | | 100 | ug/l | ND | 06/12/92 | SW 6010 |
| NICKEL | | 100 | ug/l | ND | 06/12/92 | SW 6010 |

ND = NOT DETECTED ABOVE QUANTITATION LIMIT

B = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE

= UNABLE TO QUANTITATE DUE TO MATRIX INTERFERENCE

: NOT APPLICABLE

Methodology: SM = STANDARD METHODS, 16th EDITION, 1985

EPA = #EPA600/4-79-020, MARCH 1985

* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

D = SURROGATES DILUTED OUT

J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION

SW = EPA METHODOLOGY, "#SW846", THIRD EDITION, NOVEMBER 1986

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. ALBANY SUITE C BROKEN ARROW, OK 74012 918 251-2858

Client Name: A & M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE
SUITE 227
TULSA, OK 74146

Client ID: LEACHATE POND

Project ID: IMCO, KY.

SWLO ID: 10838.08

Report: 10838.08

Collected: 08/25/1992

Report Date: 09/16/1992

Page: 1

Received: 08/27/1992

Last Modified:

Matrix: Water

| TEST | DATE EXTRACTED | DETECTION LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|--------------------|-------------------|--------------------|----------|---------|------------------|---------------------|
| *** INORGANICS *** | | | | | | |
| BOD (5 DAY) | | 1.0 | mg/l | 28.3 | 08/27/92 | SM 507/EPA 405.1 |
| ORGANIC CARBON | | 2.0 | mg/l | 10.1 | 09/04/92 | EPA 415.1/SM 505 |
| INORGANIC CHLORIDE | | 200 | mg/l | 18509 | 08/27/92 | EPA 300.0 |
| ORGANIC CHLORIDE | | 0.1 | mg/l | ND | 09/15/92 | SW 9020 |
| CONDUCTANCE | | 0.1 | uhmo/cm | 36400 | 08/27/92 | SM 205 |
| COO | | 10.0 | mg/l | 978 | 08/28/92 | SM 508A/EPA 410.1 |
| NITRATE | | 0.2 | mg/l | 5.5 | 08/27/92 | EPA 300.0 |
| pH | | 0.1 | S.U.@25c | 8.63 | 08/27/92 | EPA 150.1/SM 423 |
| TDS | | 2 | mg/l | 17870 | 08/28/92 | EPA 160.1 |
| TSS | | 2 | mg/l | 62 | 08/28/92 | EPA 160.2 |
| TOTAL SOLIDS | | 2 | mg/l | 17654 | 08/28/92 | EPA 160.3 |
| SULFATE | | 0.2 | mg/l | 206 | 08/27/92 | EPA 300.0 |

| | | | | | | |
|----------------|--|------|------|---------|----------|---------|
| *** METALS *** | | | | | | |
| ARSENIC | | 10.0 | ug/l | ND | 09/08/92 | SW 7060 |
| BARIUM | | 20 | ug/l | 200 | 09/03/92 | SW 6010 |
| CADMIUM | | 5.0 | ug/l | ND | 09/03/92 | SW 6010 |
| CHROMIUM | | 5.0 | ug/l | ND | 09/03/92 | SW 6010 |
| IRON | | 30 | ug/l | 345 | 09/03/92 | SW 6010 |
| LEAD | | 3.0 | UG/L | ND | 09/10/92 | SW 7421 |
| MERCURY | | 0.20 | ug/L | ND | 09/05/92 | SW 7470 |
| SELENIUM | | 5.0 | ug/l | ND | 09/03/92 | SW 7740 |
| SILVER | | 10 | ug/l | ND | 09/03/92 | SW 6010 |
| SODIUM | | 500 | ug/l | 2810000 | 09/03/92 | SW 6010 |

ND = NOT DETECTED ABOVE QUANTITATION LIMIT

" = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE

: UNABLE TO QUANTITATE DUE TO MATRIX INTERFERENCE

NA = NOT APPLICABLE

Methodology: SM = STANDARD METHODS, 16th EDITION, 1985

EPA = #EPA600/4-79-020, MARCH 1985

* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

D = SURROGATES DILUTED OUT

J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION

SW = EPA METHODOLOGY, "#SW846", THIRD EDITION, NOVEMBER 1986

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. ALBANY SUITE C BROKEN ARROW, OK 74012 918 251-2858

Client Name: A & M ENGINEERING & ENVIRONMENTAL SERVICES
3840 SOUTH 103RD EAST AVENUE
SUITE 227
TULSA, OK 74146

Client ID: EQUIPMENT BLANK

Project ID: IMCO, KY.

SWLO ID: 10838.09

Report: 10838.09

Collected: 08/26/1992

Report Date: 09/16/1992

Page: 1

Received: 08/27/1992

Last Modified:

Matrix: Water

| TEST | DATE EXTRACTED | DETECTION LIMIT | UNITS | RESULTS | DATE ANALYZED | METHOD REFERENCE |
|--------------------|-------------------|--------------------|----------|---------|------------------|---------------------|
| *** INORGANICS *** | | | | | | |
| BOD (5 DAY) | | 1.0 | mg/l | ND | 08/27/92 | SM 507/EPA 405.1 |
| ORGANIC CARBON | | 2.0 | mg/l | ND | 09/04/92 | EPA 415.1/SM 505 |
| INORGANIC CHLORIDE | | 0.2 | mg/l | ND | 08/27/92 | EPA 300.0 |
| ORGANIC CHLORIDE | | 0.1 | mg/l | ND | 09/15/92 | SW 9020 |
| CONDUCTANCE | | 0.1 | uhmo/cm | 35.3 | 08/27/92 | SM 205 |
| COD | | 10.0 | mg/l | ND | 08/28/92 | SM 508A/EPA 410.1 |
| NITRATE | | 0.2 | mg/l | ND | 08/27/92 | EPA 300.0 |
| pH | | 0.1 | S.U. 25c | 5.89 | 08/27/92 | EPA 150.1/SM 423 |
| TDS | | 1 | mg/l | 25 | 08/28/92 | EPA 160.1 |
| TSS | | 1 | mg/l | ND | 08/28/92 | EPA 160.2 |
| TOTAL SOLIDS | | 2 | mg/l | 58 | 08/28/92 | EPA 160.3 |
| SULFATE | | 0.2 | mg/l | ND | 08/27/92 | EPA 300.0 |
| *** METALS *** | | | | | | |
| ARSENIC | | 10.0 | ug/l | ND | 09/08/92 | SW 7060 |
| BARIUM | | 20 | ug/l | ND | 09/03/92 | SW 6010 |
| CADMIUM | | 5.0 | ug/l | ND | 09/03/92 | SW 6010 |
| CHROMIUM | | 5.0 | ug/l | ND | 09/03/92 | SW 6010 |
| IRON | | 30 | ug/l | ND | 09/03/92 | SW 6010 |
| LEAD | | 3.0 | UG/L | ND | 09/10/92 | SW 7421 |
| MERCURY | | 0.20 | ug/L | ND | 09/05/92 | SW 7470 |
| SELENIUM | | 5.0 | ug/l | ND | 09/03/92 | SW 7740 |
| SILVER | | 10 | ug/l | ND | 09/03/92 | SW 6010 |
| SODIUM | | 500 | ug/l | 6290 | 09/03/92 | SW 6010 |

ND = NOT DETECTED ABOVE QUANTITATION LIMIT

- = ANALYTE DETECTED IN BLANK AS WELL AS SAMPLE

= UNABLE TO QUANTITATE DUE TO MATRIX INTERFERENCE

NA = NOT APPLICABLE

Methodology: SM = STANDARD METHODS, 16th EDITION, 1985

EPA = #EPA600/4-79-020, MARCH 1985

* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

D = SURROGATES DILUTED OUT

J = ESTIMATED VALUE: CONCENTRATION BELOW LIMIT OF QUANTITATION

SW = EPA METHODOLOGY, "#SW846", THIRD EDITION, NOVEMBER 1986



APPENDIX C

COPY OF PROPERTY DEED

Oct 3
11 SEP 2

P 2: 51

D E E D

"THIS DEED OF CONVEYANCE made and entered into this

BOOK

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day of October, 1988, by and between CITY

OF MORGANTOWN INDUSTRIAL HOLDING CORPORATION, of Morgantown,

Butler County, Kentucky, GRANTOR, and INTERNATIONAL METAL

COMPANY, an Oklahoma Corporation, of P. O. Box 1070,

Sapulpa, OK 64066, GRANTEE.

1050
4000
7050

WITNESSETH:

That for and in consideration of the sum of SIXTY

THOUSAND AND NO/100 DOLLARS (\$60,000.00) cash in hand paid,

the receipt of which is hereby acknowledged, the GRANTOR has

bargained and sold and by these presents do hereby bargain,

sell, alien, grant and convey unto the GRANTEE, in fee

simple, a certain tract or parcel of land lying in Butler

County, Kentucky, and being more particularly described as

follows, to-wit:

Being a 187.596 acre tract of land located
Southwest of the junction of Ky Hwy. 1468 and Ky
Hwy. 70, approximately 1.5 miles west of
Morgantown, Butler County, Kentucky and more
particularly described as follows:

Beginning at an iron stake in the South right of
way of Ky Hwy 70 515.00 feet west of the
intersection of the right of way with the western
right of way of Ky Hwy 1468; thence S 18 deg. 56
min. 38 sec. E 1001.82 feet; thence S 65 deg. 29
min. 59 sec. E, 742.49 feet; thence N 12 deg. 30
min. 04 sec. E, 429.00 feet; thence S 62 deg. 30

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survey performed by Mark P. Johnson, KY REG. L. S.
#2557 revised June 16, 1988.

Being the same property conveyed to City of
Morgantown Industrial Holding Corporation, of
Morgantown, Butler County, Kentucky, by deed dated
June 9, 1988, and recorded in Deed Book 119, Page
37, records of the Butler County Clerk's Office.

TO HAVE AND TO HOLD the above described property
together with all improvements located thereon and
appurtenances thereunto belonging unto the GRANTEE, in fee
simple, its successors and assigns forever, with covenant of
GENERAL WARRANTY.

IN TESTIMONY WHEREOF, witness the hand of the
GRANTOR this the day and date first above written.


PRESIDENT

STATE OF KENTUCKY
COUNTY OF BUTLER

I, W^m Edward Schreiner, Notary Public in
and for the State and County aforesaid, do hereby certify
that the foregoing deed from Charles T. Black,
President, of City of Morgantown Industrial Holding
Corporation to International Metal Company, an Oklahoma
Corporation, was this day produced to me and duly
acknowledged before me by Charles T. Black,
President, of City of Morgantown Industrial Holding
Corporation, to be its official free act and deed.

October, 1988. 3rd day of

THIS DEED made and entered into this the 7th day of July, 1988 by and between EXIE RUTH HAWES, single, party of the first part, and INTERNATIONAL METAL CO., an Oklahoma Corporation, of P. O. Box 1070, Sapulpa, OK 74066, party of the second part.

WITNESSETH:

That the party of the first part, for and in consideration of the sum of TWENTY-FIVE THOUSAND DOLLARS (\$25,000.00), cash in hand paid, the receipt of which is hereby acknowledged, has bargained and sold, and by these presents, does hereby bargain, sell and convey unto the party of the second part, its successors and assigns, a certain tract or parcel of land, lying in Butler County, Kentucky, and more particularly described as follows, to-wit:

TRACT ONE

Being a 7.633 acre tract of land located Southwest of the junction of Ky Hwy. 1468 and Ky Hwy. 70, approximately 1.5 miles west of Morgantown, Butler County, Kentucky and more particularly described as follows:

Beginning on an iron stake located at the point of intersection of the South Right of Way line of Ky Hwy. 70, with the Southwest Right of Way line of Ky Hwy. 1468, thence from the point of beginning with the Southwest line of Ky Hwy. 1468, S 45 deg. 36 min. 38 sec. E, 122.23 feet to a concrete right of way marker, thence continuing with the aforesaid

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Tax 250
35

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#2557 on 4-16-88, using a bearing taken along Coleman and Martin's line.

TRACT TWO

Being a 12.538 acre of land located Southwest of the junction of KY Hwy. 1468 and KY Hwy. 70 approximately 1.5 miles West of Morgantown, Butler County, Kentucky and more particularly described as follows:

Beginning on an iron pin stake located at a point where the Southwest right of way line of KY Hwy. 1468 intersects the centerline of Renfrow Creek, a new division corner to Parcel A and Parcel B; thence with the Southwest right of way line of KY Hwy. 1468, S 28 deg. 30 min. 06 sec. E, 260.27 feet to a concrete right of way marker; thence continuing with the aforesaid right of way, S 41 deg. 55 min. 29 sec. E, 27.90 feet to an iron stake, a northerly corner to Coleman and Martin's tract of land, recorded in Deed Book 109, Page 269 records of the Butler County Court Clerk's Office; thence leaving the aforesaid right of way with Coleman and Martin's line N 62 deg. 30 min. W, 142.12 feet to an iron stake, Coleman and Martin's corner; thence with Coleman and Martin's line, crossing the Old Gardner Lane Road S 12 deg. 30 min. 04 sec. W, 429.00 feet to an iron stake, a corner to Coleman and Martin, South of the Old Gardner Lane Road; thence with Coleman and Martin's line, crossing the Old Gardner Lane Road N 65 deg. 29 min. 59 sec. W, 742.49 feet to an iron stake, a corner to Coleman and Martin's tract of land, located on the north side of the Old Gardner Lane Road; thence with Coleman and Martin's line N 18 deg. 56 min. 38 sec. W, 766.82 feet to an iron stake, located in Renfrow Creek, a new division corner to Parcel A and parcel B, referenced S 18 deg. 56 min. 38 sec. E, 235.00 feet from an iron stake, located in the South right of way line of KY Hwy. 70, on the East bank of Renfrow Creek, said iron stake being an easterly corner to Coleman and

TO HAVE AND TO HOLD said tract of land, with the appur-
tenances thereunto belonging unto the party of the second part,
its successors and assigns, forever, with covenants of General
Warranty.

IN TESTIMONY WHEREOF, the party of the first part has
hereunto subscribed her name the day and date aforesaid.

Exie Ruth Hawes
EXIE RUTH HAWES

THIS INSTRUMENT IS PREPARED BY THE UNDERSIGNED
WITHOUT THE BENEFIT OF A TITLE EXAMINATION AND THE
PROPERTY DESCRIPTION CONTAINED HEREIN IS FURNISHED BY
THE GRANTOR/MORTGAGOR AND IS NOT THE RESPONSIBILITY OF THE
ATTORNEY PREPARING THIS DEED

PREPARED BY:

Richard M. Daye
DEYE AND BROWNING
P. O. BOX 340
MORGANTOWN, KENTUCKY 42261

STATE OF KENTUCKY)

COUNTY OF BUTLER)

I, *Louisa R. Miller*, Notary Public in

and for the State and County aforesaid do certify that the
foregoing Deed from Exie Ruth Hawes, single, to International



APPENDIX D

LOGS



APPENDIX E

DST RESULTS AND FORMATION FLUID ANALYTICAL REPORTS



APPENDIX F

INJECTION TEST AND ACID JOB RESULTS



APPENDIX G

DRILLING RECORDS